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RECONSTRUCTION OF THE VALVES OF THE HEART

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THE first descriptions of surgical operations on the heart are contained in the writings of Cappelen in September, 1895, of Farnia in March, 1896, and of Rehn in September, 1896, when they described the repair of wounds of this organ. Since that time many wounds of the heart have been sutured, and on many occasions foreign bodies have been removed from its wall.

Samways, a British veterinary surgeon, in 1898 printed an article in which he suggested that "some of the severest cases of mitral stenosis will be relieved by lightly notching the mitral orifice". In 1902 Lauder Brunton suggested "that stenotic lesions of the mitral valve might be susceptible of surgical intervention". His ideas undoubtedly resulted from experimental observations of artificially created valvular lesions by Becker in 1872, Klebs in 1875, Cohnheim in 1877, Timofejew in 1888, and Rosenback in 1899. The contributions of Haecker in Germany and of Cushing and Branch, in collaboration with Henry and Hever, which appeared in 1907, were the first to report recovery in experiments in which the cardiac valves were cut. Bernheim in 1909 and Schepelmann in 1912 published series of experiments which were designed to produce constriction of the heart valves. Contributions by Jeger, Carrel and Tuffier also contain much information on this field of experimental surgery. In 1922 Allen and Graham constructed a new instrument in the form of an endoscope by which the valves could be divided under direct vision. Cutler and Beck continued experiments of this nature, with and without direct vision of the valves. The first clinical case was operated upon by Doyen in 1913 but the patient did not

recover. In 1914 Tuffier operated upon a case of aortic stenosis and since 1923 Cutler and Beck have operated upon several cases with their cardiovalvulotome.

The following work is a continuation of experiments on cardiac circulation which were started in the University of Toronto in 1932. The present series of experiments on intra-cardiac surgery were started in 1936, when resected heart valves were successfully replaced by venous grafts.

The lateral cusp of the mitral valve was resected after a modification of the method described by Cutler. The approach to the valve was through the apex of the auricle. All the eight control animals died within 6 days and several of them within 12 hours. In 8 other animals a similar resection of the lateral cusp of the mitral valve was carried out. In 6 of these the valve was replaced immediately and 2 of these animals are alive and perfectly well, now 6 months following the operation.

In preliminary dissections the bundle of His was dissected out and the surface markings for its course defined so that it would not be injured during the operation. The cardiovalvulotome described by Cutler, with the blade closed, was passed through a small opening in the apex of the left auricular appendix. A purse-string suture which had been placed about this area before the incision was made was tightened slightly to prevent leaking of blood. The instrument was passed through the mitral ring and the blade allowed to open. The lateral cusp of the valve was picked up in the notch of the instrument, and when the blade was closed a piece of valve averaging 8 x 10 mm. and some chordæ tendineæ were excised and the instru-

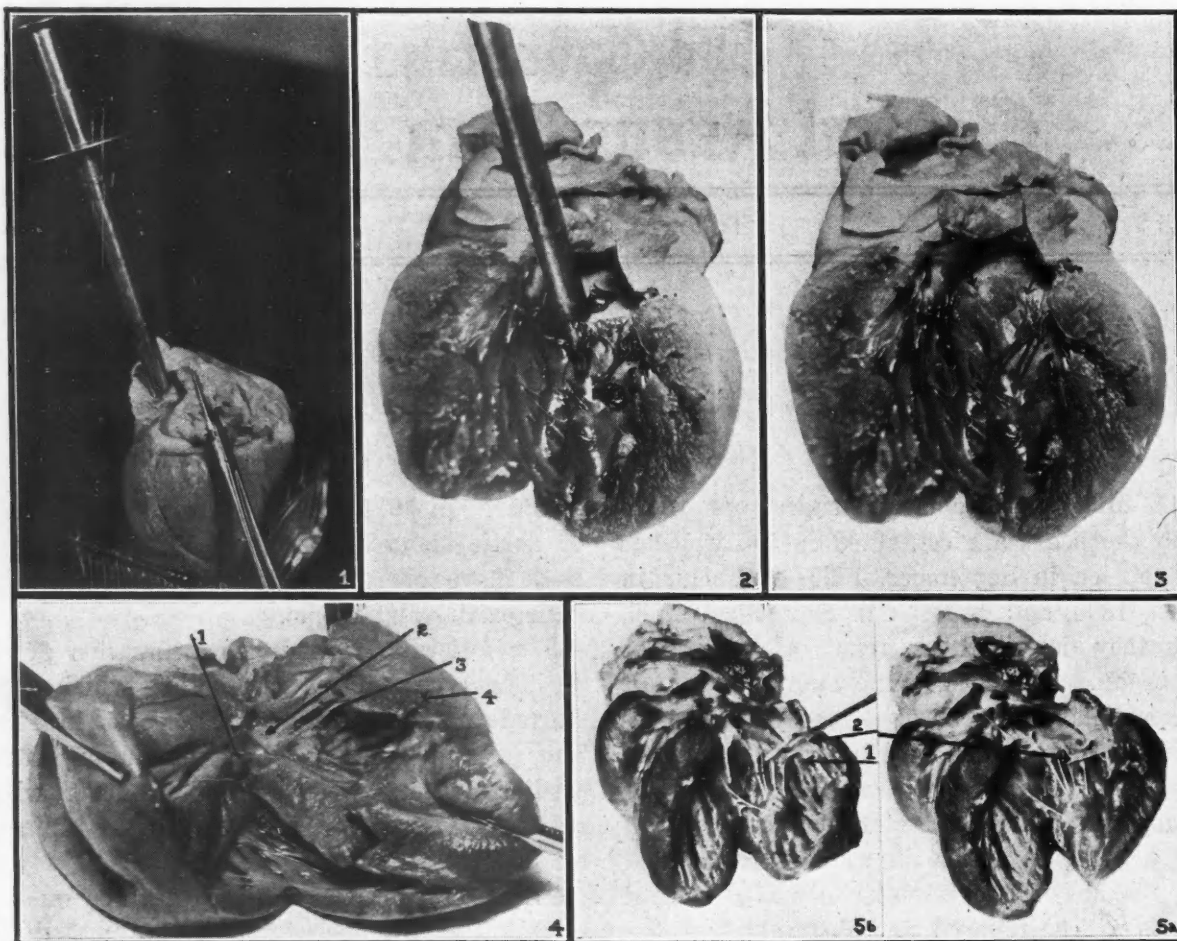


Fig. 1 (S 1083).—The valvulotome in place through the apex of the auricle. **Fig. 2** (S 1089).—The valvulotome in place grasping lateral cusp of the mitral valve. **Fig. 3** (S 1090).—Part of valve missing, following resection operation in dog No. 2 of the control series. The part of valve removed measured 8×13 mm. **Fig. 4** (S 1001, dog No. 5).—With heart opened showing remaining cusp of mitral valve and the replaced valve. (1) Replaced valve; (2) normal cusp; (3) chordæ tendineæ; (4) cut wall of left ventricle. **Fig. 5a** (S 1094).—Replaced valve in position. **Fig. 5b** (S 1095).—Shows (1) gap where part of valve was removed; (2) replaced valve retracted.

ment withdrawn. The opening in the auricular appendix was closed with a ligature. Immediately following this there was evidence of increasing dilatation of the left ventricle and auricle, with increasing cyanosis of the cardiac muscle and of the dog's tongue.

About $3\frac{1}{2}$ inches of external jugular vein were excised and cleared thoroughly of surrounding fat. The section was turned inside out so that only its endothelial lining would be in contact with the blood stream. A silk suture was attached to each end, and with one of these the vein was drawn into a cannula large enough to receive it. The cannula was passed through the anterior heart wall, lateral to the descending branch of the left coronary artery, at a point which had been determined previously on dissection of many hearts. The point selected on the anterior wall was about $\frac{3}{8}$ of an inch on the

ventricular side of the annulus fibrosus. The cannula was passed across the cavity of the heart, to emerge on the posterior surface of the left ventricle about the same distance from the annulus fibrosus. The suture on the end of the vein was grasped and the cannula withdrawn, leaving the vein across the cavity of the heart. The new valve was thereby placed across the cavity of the heart so that it would lie in the line of the resected valve and in the position of greatest advantage as determined by many experiments. Both ends of this new valve were sutured to the epicardium of the left ventricle, avoiding damage to the larger branches of the coronary artery. The new valve was sutured in position so that it had very slight tension. This tension was shown by experiment to allow of sufficient movement of this structure within the heart cavity, so that it would bulge during

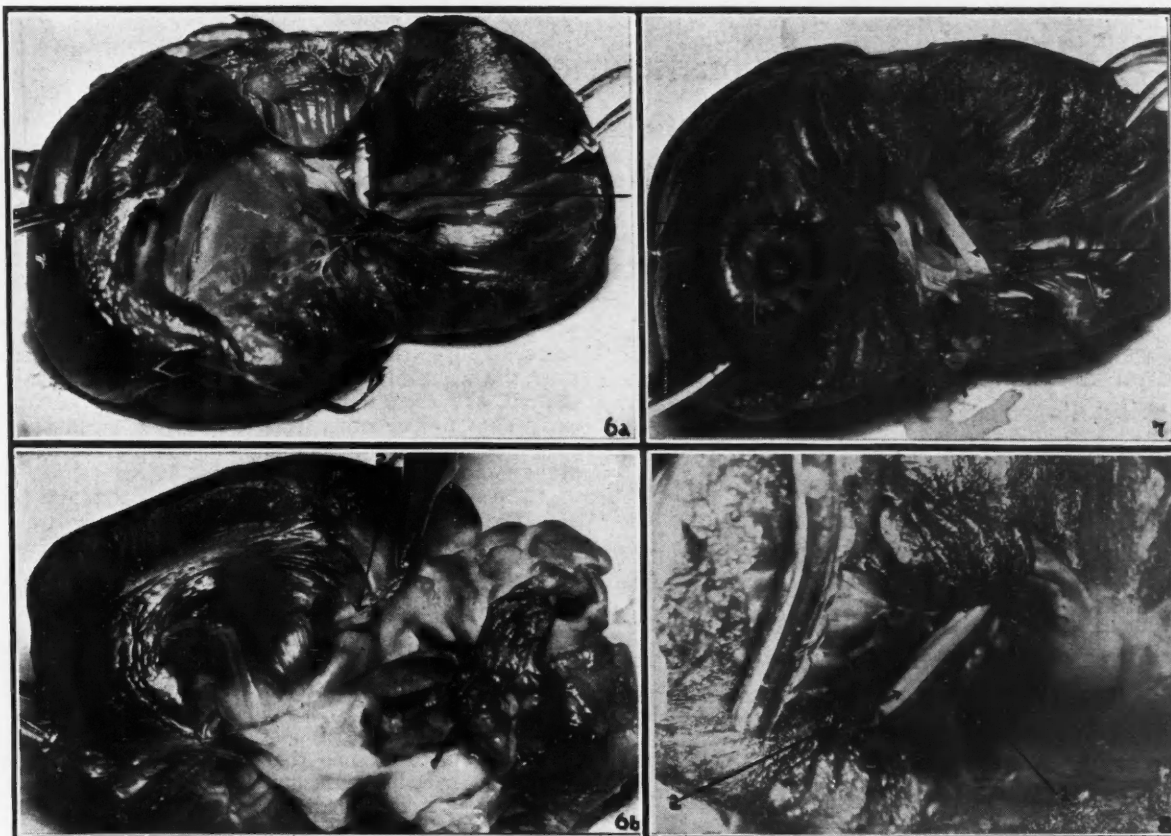


Fig. 6a (dog No. 2).—Replaced valve in position. Fig. 6b (dog No. 2).—Outer surface of heart. (1) End of valve on surface of heart; (2) other end of venous graft. Fig. 7.—Shows (1) remaining cusp of mitral valve; (2) replaced valve. Fig. 8.—Shows (1) normal remaining cusp; (2) replaced valve.

ventricular systole into the opening left by the resected valve. In none of these experiments was there a great loss of blood. Immediately following the placing of the new valve the increasing dilatation and cyanosis of the heart ceased, the heart rate improved, and the colour of the dog's tongue improved.

During the resection of the valve in some of both groups the ventricle began to fibrillate and we were unable to restore normal rhythm. If, however, the resection of the valve was carried out successfully all the animals survived the operation of placing the new valve. Four died of infection, either of the pericardium or pleural cavity or lungs. Two died on the table of

ventricular fibrillation, and in these there was no opportunity to place the new valve in position. In the remaining 6 animals, where the valve was replaced satisfactorily, 4 died of infection in from two to ten days. The two surviving animals (Figs. 4 and 5) are quite well, without oedema, or signs of heart failure, and can take their part with the other dogs in the runway. There is a soft systolic murmur in both these hearts.

The Banting Foundation has generously supported this investigation by making grants to F.R.W. and R.M. This investigation has been carried on in conjunction with the work on heparin. The expert assistance of Mr. Walter Cowan has been of the greatest value.

OVARIAN EXTRACT IN PRURITUS.—L. N. Elson considers that pruritus vulvæ and pruritus senilis are degenerative neuritides, and, on the theory that the ovaries form specific nerve-regenerating hormones, has for sixteen years been treating cases of these diseases with an extract of whole ovary. He gives 5 grains three times daily one hour before meals on the first day, two doses the second day, and one dose the third day,

continuing the same sequence for many weeks. He finds the results excellent in both sexes. He uses the same treatment for brachial neuritis and for the atrophic arthritides of the female and male climacteric, and in the aged, with good results. For local application he recommends saturated solutions of sodium bicarbonate or magnesium sulphate as compresses, or camphor and menthol, 2 per cent each, in liquid paraffin.—*Urol. cutan. Rev.*, October, 1937, p. 713. Abs. in *Brit. M. J.*

URINARY OBSTRUCTION IN CHILDREN*

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DISEASES of the genito-urinary tract in infants and children are sufficiently common to rate them among the important lesions of early life. Repeated studies have revealed that children are subject to practically the same urological diseases as adults. However, the most common lesions found in the urinary tract of the young are obstructive in type, and the great majority of them result from anomalous development. When one realizes that the incidence of congenital anomalies in the genito-urinary tract is higher than in any other system of the body it can be appreciated why the greatest field of urology today lies in the early diagnosis and treatment of these abnormalities.

The study of urological disease in children is not new, yet the importance of a complete urological investigation in the young has not been fully appreciated by the medical profession in general until quite recently. We have failed consistently to realize the gravity of persistent urinary complaints and findings. In the past few years there has been a beneficial change. Internists and pædiatricians have been very willing to cooperate with the urologists, with the result that today many more children are being examined urologically than ever before. Moreover, all children's hospitals of repute have come to realize the importance of genito-urinary diseases in children, and have established urological services.

Any obstructive lesion in the genito-urinary tract is of prime importance because of the back pressure and destructive changes that it eventually produces on the renal parenchyma. It is also an important factor in causing urinary stasis and infection. If the obstructive lesion is not removed the destructive process goes on until the kidney or kidneys are destroyed. The importance of recognizing such obstructing lesions early is apparent.

For the sake of emphasis we wish to discuss briefly two specimens that were found in young children.

The first one was removed at operation (Fig. 1). It shows a destroyed kidney with a large dilated ureter. There are three definite obstructive lesions present. One is at the uretero-pelvic junction, another at the junction of the middle and lower thirds of the ureter, and a third (not shown on the photograph) near the ureteral orifice. We feel justified in saying that if the obstructions had been recognized at an early date proper procedures could have been carried out, thus preventing the complete destruction of both kidney and ureter.

The second specimen was found at autopsy (Fig. 2). The child, male, aged 9 years, was admitted to the hospital in uræmia. A diagnosis of bilateral pyonephrosis and pyo-ureter was made. He died shortly after. The post-mortem examination revealed completely destroyed kidneys, large dilated ureters, trabeculations and diverticula of the bladder, and finally a cyst in the posterior urethra. Apparently this cyst caused an obstruction which ultimately destroyed the urinary tract. This case too stresses the need for early recognition of urinary obstruction. It is reasonable to assume that the urinary tract might have been saved from complete damage if the child had undergone an urological examination early in life.

Campbell, in a recent article on urinary obstruction in children, emphasized this very point by stating that the greatest field for preventive medicine today lies in the early recognition and treatment of these obstructive lesions in the young. It is of interest to emphasize at this time the prevalence of multiple obstructive lesions in the same organ. It is not uncommon to discover at operation or on the autopsy table two or three varieties of congenital lesions along the course of the one ureter. This possibility must always be borne in mind by the surgeon (Fig. 3).

Urinary obstruction in children may be divided into two groups: (1) upper urinary tract obstructions; (2) lower urinary tract obstructions. In the upper urinary tract group the obstruction may be encountered anywhere along the ureter, including the ureteral orifice. The lower urinary tract lesions, on the other hand, include all obstructions occurring anywhere from the external urethral meatus to the neck of the bladder.

OBSTRUCTIONS OF THE UPPER URINARY TRACT

1. *Obstruction due to aberrant vessels.*—Although vascular obstruction of the ureter in children is not an uncommon occurrence, yet the condition is frequently unrecognized and rarely diagnosed. The aberrant vessels which

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may be arteries, veins, or both, usually cross anteriorly to the ureter. The most common site of these is in the upper portion of the ureter, although cases have been observed where the vessels cross the lower portion of the ureter near the bladder. It will be appreciated at this

point that not all anomalous vessels that cross the ureter cause urinary obstruction. Several cases of aberrant vessels have been observed at autopsy and on the operating table without any evidence of hydronephrosis or hydroureter.

There has been considerable controversy re-

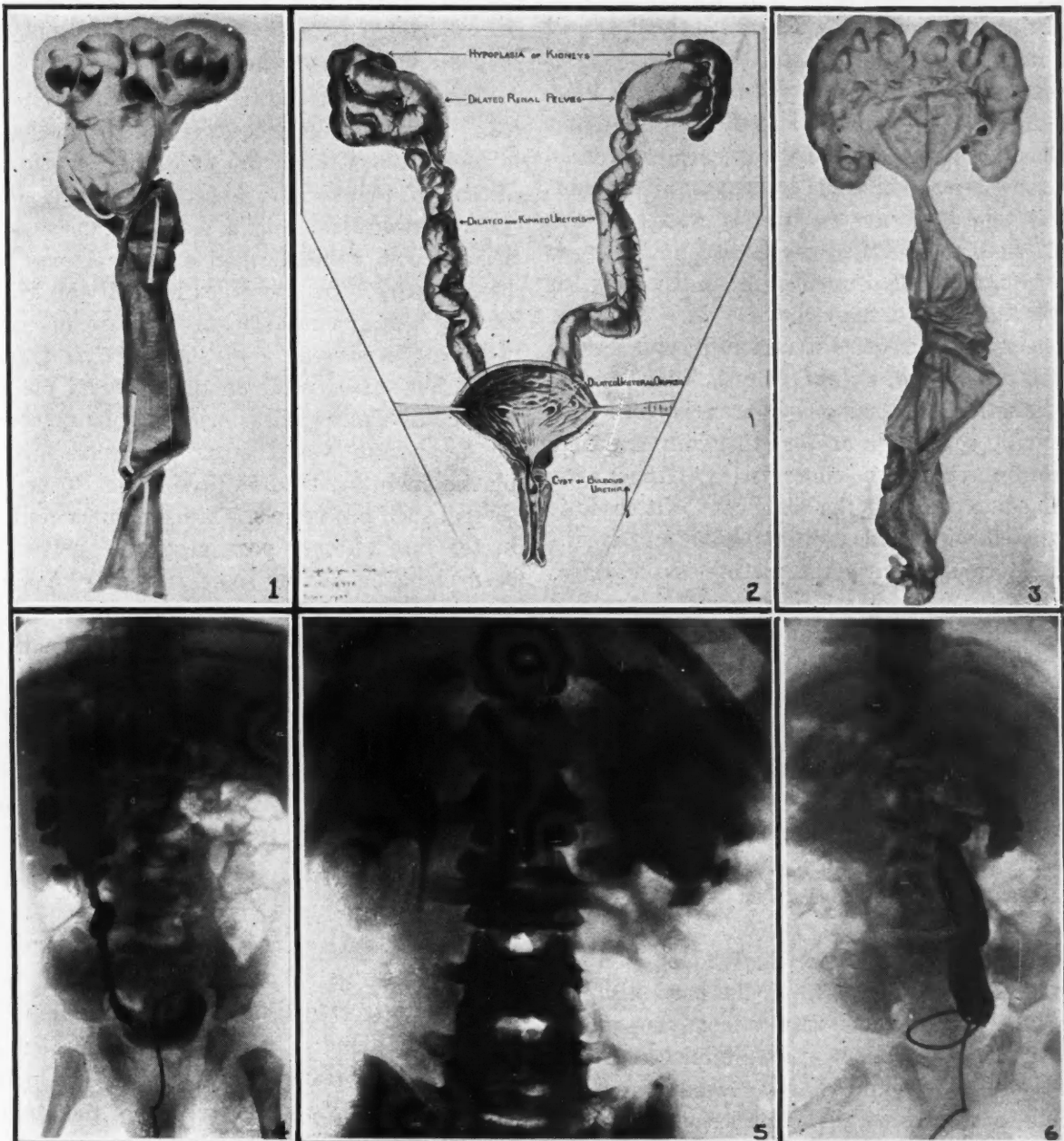


Fig. 1.—A destroyed kidney and a large dilated ureter removed from a young child. There are two definite obstructive lesions shown. One is at the uretero-pelvic junction, and the other at the junction of the middle and lower thirds of the ureter. There was a third obstruction near the ureteral orifice (not shown on this photograph). **Fig. 2.**—Specimen removed at autopsy from a male child aged 9 years. Note the large dilated renal pelvises and ureters; also the trabeculated bladder, and the presence of a cyst in the posterior urethra. **Fig. 3.**—A specimen removed from a young child illustrating the presence of several obstruction lesions in the same organ. **Note** (1) the narrowing at the uretero-pelvic junction; (2) the presence of multiple valve-like projections about the middle of the ureter; (3) a narrowing of the ureter as it enters the bladder. **Fig. 4.**—A large hydronephrosis and hydroureter. These were caused by several tight fibrous bands at the uretero-pelvic junction, and by three small aberrant vessels crossing the upper and middle portions of the ureter. **Fig. 5.**—A large hydronephrosis on the left side. This was due to an aberrant artery and vein, which were firmly adherent to the lower portion of the pelvis. **Fig. 6.**—A moderate hydronephrosis and a very large dilated ureter. This was due to a definite stricture just near the ureteral orifice.

garding the etiological relationship of aberrant vessels and hydronephrosis. It is believed by some that hydronephrosis results from direct compression of the ureter by the vessel; others are of the opinion that there is primarily some renal ptosis which in turn causes the aberrant vessel to compress the ureter. Quinby assumes that the pulsation of the aberrant artery against the ureter inhibits peristalsis and so causes stasis. The pathological picture depends upon the degree of obstruction and the length of time it has been present. In early cases a mild hydronephrosis is found; as the compression becomes more aggravated greater stasis results, until, finally, infection sets in and now there is a large infected hydronephrosis. Ultimately the entire kidney is destroyed.

The symptoms of obstruction from aberrant vessels are those of hydronephrosis, with or without infection. A common symptom is pain. This is usually present in one or other loin, and may be dull or colicky in character. At times it is confined entirely to the abdomen. Often it is associated with chills, fever, nausea and vomiting. More frequently the picture is suggestive of a gastro-enteritis. Recently we observed a case that resembled an acute intussusception. The symptomatology is characteristically intermittent. There may be long intervals of months or even years during which the patient may be absolutely free of symptoms. On the other hand attacks may occur very frequently.

When infection sets in symptoms of cystitis appear. There is frequency, dysuria, and even hæmaturia. In late cases a mass may be felt in the loin, and when fever and chills are present severe tenderness may be elicited on palpation. Systemic symptoms may also be present. This of course results from long-standing urinary infection and diminished renal function. The child has anorexia, becomes anæmic, and loses weight. If a lesion is present on both sides uræmia may set in, with malaise, vomiting, and even stupor.

There are no signs or symptoms that are pathognomonic of obstruction by aberrant vessels; other forms of urinary obstruction may give the same clinical picture. However, a positive diagnosis can be made in many cases if all available data are studied. Thus the history, physical examination, urinalysis, kidney function tests, and, finally, cystoscopy and pyelo-

graphy, are all important in the diagnosis. The pyelogram undoubtedly is the most important single aid. There is usually a hydronephrosis, with at times an abrupt transverse ureteral obstruction below it (Fig. 5). Occasionally the obstructing vessel causes a complete filling defect in the outline of the pyelogram. In extreme cases the pyelographic substance does not pass beyond the obstruction.

The treatment of this lesion is always surgical. Whether the procedure will be radical or conservative will depend of course on the condition of the kidney. If the obstruction has been present for a long time and has caused severe renal damage, then a nephrectomy may be necessary. On the other hand if the kidney has not been irreparably hurt a plastic operation will be the procedure of choice. The type of operation will depend on the size and position of the vessels. Small arteries may be sacrificed. If the aberrant vessel is too large some form of plastic operation is to be performed. There are several such procedures. Transplantation of the ureter into another portion of the pelvis has been recommended by some. Recently Young¹⁵ described a plastic operation whereby the ureter is not severed. He simply removes a portion of the renal pelvis in front, and another portion behind. In so doing the renal pelvis and ureter are drawn away from the obstructing vessel, thus eliminating the necessity of severing any of these structures.

2. *Obstruction due to fibrous bands.*—This type of ureteral obstruction is also common, and is usually encountered at or near the ureteropelvic junction. The bands may assume a variety of forms. They may appear as longitudinal sheets extending from the renal pelvis downwards along the course of the ureter, or they may run transversely, pulling the pelvis and ureter towards the lower pole of the kidney. Not uncommonly these bands encircle the entire ureter, causing a definite and often complete constriction at that point. Several of these are associated with a definite stricture. Whether the latter is the cause or the result of the fibrous bands is debatable. The pathological picture, the clinical history, and the physical findings are identical with those of aberrant vessel obstruction. Even the pyelographic studies may be the same.

The treatment of this condition is primarily to overcome the obstruction, and operation should be performed before the renal parenchyma is destroyed. In early cases the proper procedure is simply to remove the obstructing fibrous bands. Usually this can be accomplished very readily. In a large hydronephrosis a portion of the renal pelvis may be removed. It must be appreciated that more than one obstructive lesion of the ureter may be present, and the proper procedure in each case is to be carried out. For example, there may be a constriction at the uretero-pelvic junction and one or more aberrant vessels crossing the ureter (Fig. 4).

3. *Ureteral stricture*.—This pathological lesion is one of the most common causes of ureteral obstruction. Campbell² in a large series found that 50 per cent of the cases of ureteral blockage were due to strictures. He reported 101 such lesions in 1936. The stricture may occur anywhere along the course of the ureter, but the most common sites are at or near the uretero-pelvic junction and near the ureteral orifice. Bilateral strictures may also occur; Campbell found 23 such bilateral lesions in his 101 reported cases. In our experience ureteral strictures have always been associated with fibrous bands or adhesions. In several cases the strictures were actually surrounded by this tight fibrous tissue, suggesting very strongly that the lesions were secondary, resulting from long-continued pressure of the fibrous bands. Aberrant vessels have also been associated with ureteral strictures.

The pathological picture that results from a ureteral stricture depends on the site of the obstruction. If the lesion is at or near the uretero-pelvic junction hydronephrosis results. On the other hand, if the narrowing is in the lower ureter, one finds both a hydronephrosis and a hydroureter.

The symptoms of ureteral obstruction are similar to those of obstruction due to bands or aberrant vessels. The principal manifestations are pain, pyrexia, urinary disturbances, with at times chills and fever, nausea and vomiting. Hæmaturia and a mass in the loin may also make their appearance.

The diagnosis of ureteral stricture depends upon all the data that can be obtained in the case. Cystoscopic examination is the most important single examination. If a stricture is

quite marked the introduction of a ureteral catheter may be difficult. Further attempts with other types of catheter may be successful, and you then discover a definite hydronephrosis which can be demonstrated by aspirating large quantities of urine from the renal pelvis. Pyelography will demonstrate a dilatation above the obstruction. If the narrowing is high a hydronephrosis only is present; if the lesion is low both a hydronephrosis and a hydroureter can be observed (Fig. 6).

The treatment of ureteral stricture is by operation, which may be either conservative or radical. The conservative method consists of repeated dilatations of the stricture by bougies. In some cases this form of treatment may be sufficient. The majority of ureteral strictures, however, require a more radical procedure. Exploration is carried out, and one of several plastic operations is decided upon. The Fenger operation consists of a longitudinal incision through the stricture, with transverse suture according to the Heinecke-Mikulicz principle for pyloroplasty. This operation has been praised by some and condemned by many. Herbst and Polkey⁸ have shown experimentally that following this procedure the ureter buckles at that point. A more popular procedure is the utilization of the Rammstedt technique for pylorospasm. It was first applied to the ureter by Davis,⁴ and later by Vose,¹¹ Bidgood and Roberts.¹ This procedure consists in cutting longitudinally the strictured muscle down to the mucosa in one or more places. Others, like Quinby¹⁰ and Walters,¹² recommend re-implanting the ureter into another portion of the pelvis. It must be remembered that ureteral strictures are usually associated with fibrous bands, and these have to be removed thoroughly before any form of pyeloplasty is carried out.

4. *Nephroptosis*.—Renal ptosis, while not an uncommon finding, is less frequently encountered than any of the above mentioned lesions. The condition is most commonly met with in thin children, and is usually associated with general visceroptosis. The right kidney is more often affected than the left, although both may be ptosed. The condition is more commonly found in females.

In renal ptosis a kink at the uretero-pelvic junction is usually present. This narrowing may be enhanced by a tight band or even an

aberrant vessel. As the hydronephrosis develops more nephroptosis results, with increasing ureteral obstruction. Then the usual vicious circle is formed. If the obstruction is present for a long time infection supervenes and ultimately severe renal damage results. It is obvious that early recognition and treatment of the condition are essential.

Palliative measures may be resorted to. The child is put to bed, flat on the back, for two to three weeks, followed by the wearing of a good abdominal support. If this treatment is unsuccessful then the proper procedure is nephropexy,

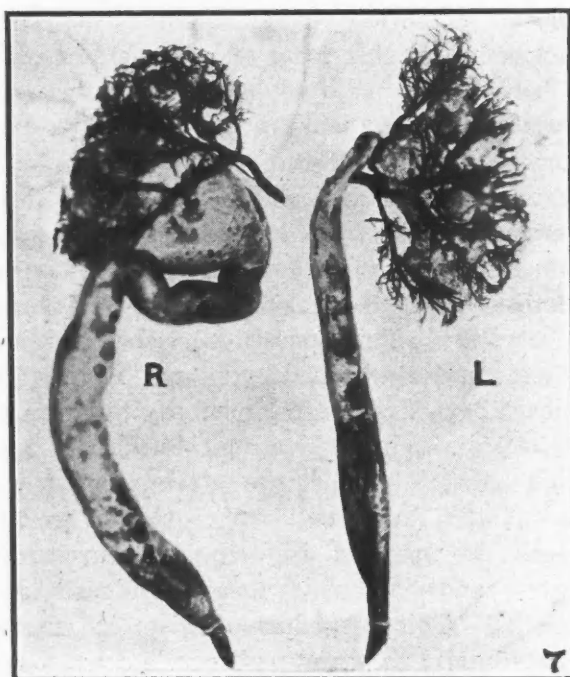


Fig. 7.—Casts of the renal pelves, ureters, and renal circulation. Note the spiral torsion at the uretero-pelvic junction on both sides, more marked on the right. Note also the tortuosity of the right ureter in its upper third. Both ureters are dilated throughout, and each had a stricture near the ureteral orifice.

including the removal of adhesions and the straightening of the ureter. If a large hydronephrosis is present part of the renal pelvis should be removed. After operation the child should be kept flat in bed for at least three weeks.

5. *Ureterocele*.—By ureterocele we mean the cystic dilatation of the lower end of the ureter due to a stricture or narrowing of the ureteral orifice. This lesion must not be confused with the so-called prolapse of the ureter, which is really an eversion of the ureteral mucous membrane into the bladder. It is not common, but several cases have been reported in the literature.

Recently Gibson⁷ discussed the subject and reported 2 personal cases. Campbell² in 1934 mentioned 11 cases. Bilateral cases have also been encountered.

Ureterocele is believed to be the result of an anomalous development of the lower ureter. There are a number of theories regarding its origin. The consensus is, however, that it results from the stenosis of the ureteral orifice caused by the epithelial bar growing downwards to separate the ureter from the primary excretory duct.

There are no symptoms that are characteristic of ureterocele. Clinically the picture is that of urinary obstruction, with or without infection.

A positive diagnosis of ureterocele can only be made by a cystoscopic examination. By this procedure one definitely observes the lesion. A cystogram and pyelogram may also be taken, and usually are of considerable value (Fig. 8).

The treatment is to overcome the obstruction early and to establish adequate drainage. This conservative method consists in repeated ureteral dilatations by means of bougies. Where the ureteral orifice is very small it may be necessary to cut the orifice with either cystoscopic scissors or a fulgurating electrode. In several cases none of these procedures is practical, and one may have to resort to fulguration and even excision of the cystic dilatation. In long-standing cases where the kidney and ureter are badly damaged a nephrectomy and complete ureterectomy is the proper procedure.

6. *Torsion of the ureter*.—Torsion of the ureter is rare and very few cases are reported in the literature. The torsion is usually at the uretero-pelvic junction, and in a number of instances recorded other congenital anomalies were also present in the genito-urinary tract. For example, Woelfler¹³ found a case of ureteral torsion associated with congenital valves in the course of the ureter. In our case there was a spiral torsion at the uretero-pelvic junction on both sides, more marked on the right. In addition there was tortuosity of the right ureter in its upper third. Both ureters were dilated throughout, and each had a stricture near the ureteral orifice (Fig. 7).

All writers believe that torsion of the ureter results from the persistence of the rotation of the Wolffian duct during its development (Eisendrath and Rolnick⁵).

7. *Ureteral calculus*.—Calculus in the ureter is of course not a congenital anomaly. However, in the majority of cases it results from urinary stasis caused by a congenital obstructive lesion somewhere in the urinary tract.

Years ago calculous disease in children was commonly encountered. This was particularly true in Asia and several parts of Europe. With improvement of sanitation and dietetics its incidence has greatly diminished. Today in this

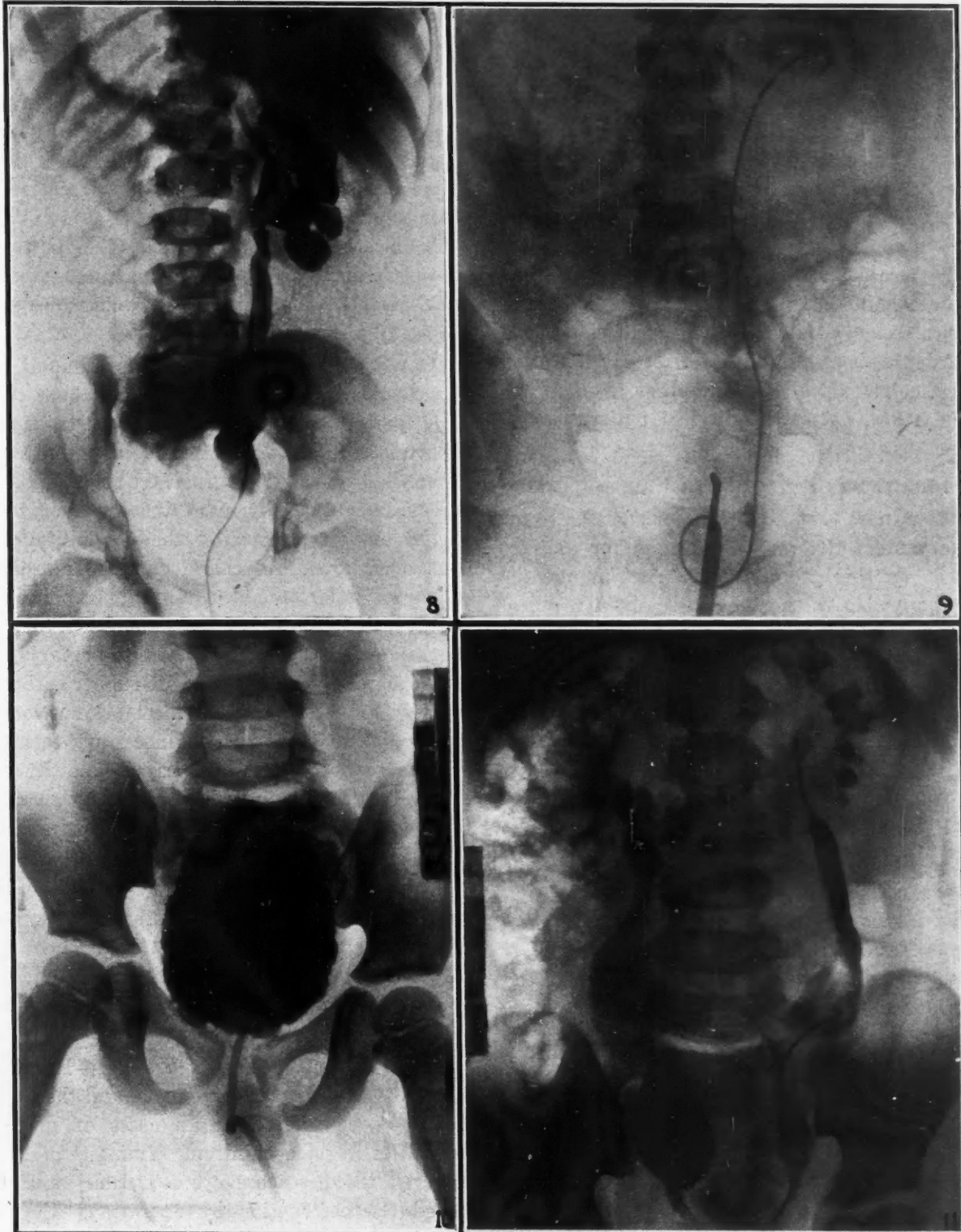


Fig. 8.—A large hydronephrosis and hydroureter. A large ureterocele was observed on cystoscopic examination. Fig. 9.—An elongated calculus in the lower third of the ureter in a female aged 7 years. Fig. 10.—Cystogram in a male child aged 7 years, with a contracted vesical neck. Note the large bladder with many small diverticula. Fig. 11.—Pyelo-ureterogram bilateral in the case just described (Fig. 10). Note the large dilated ureters.

country calculus disease in children is quite rare. Campbell, in a series of 508 children with a urological problem, found 2 ureteral and 6 renal calculi only. This finding has been true in all the clinics in this country.

The clinical history is that of a renal or ureteral colic which very often is associated with nausea, vomiting, or both. The urine nearly always shows gross or microscopic blood. The diagnosis is made on the history, physical examination, urinalysis, and, finally, x-ray examination. Cystoscopy with pyelography should always be performed (Fig. 9). Intravenous urography may also be used and is usually a very valuable asset.

The treatment depends on the site and size of the calculus. If it is high up in the ureter surgical removal is the procedure of choice. If the calculus is small and low, ureteral dilatation will usually suffice. On the other hand, if the stone is low, but large, surgical removal is the proper treatment.

OBSTRUCTIONS OF THE LOWER URINARY TRACT

Let us now turn to the lesions of the lower urinary tract that are responsible for urinary stasis. In this group the obstruction may be found anywhere along the course of the urethra, from the external urethral meatus to and including the vesical neck. For the sake of clarity the lower urinary obstructions may be divided into two groups, namely, those found in the anterior urethra and those in the posterior portion.

The most common obstructive lesions of the anterior urethra are meatal strictures, stenosis of the prepuce, and stricture of the anterior urethra.

These lesions which are met with not infrequently respond to treatment quite readily. A meatotomy and urethral dilatation correct the anterior and urethral strictures. For the stenosis of the prepuce a dorsal slit or circumcision may be performed.

Obstructive lesions of the posterior urethra and vesical neck.—These conditions are not uncommon and give clinical pictures which simulate those observed in men suffering with prostatic obstruction. The children usually complain of frequency, urgency, difficulty in urination, small stream, and hesitancy. At times there is dysuria and even hæmaturia. Several of these children have incontinence, and a diag-

nosis of functional enuresis is frequently made. In advanced cases there are residual urine, infection, and signs of renal insufficiency. If the obstruction is not removed uræmia eventually sets in, with death ensuing shortly after.

The bladder may show trabeculations and even diverticula. The ureters are dilated and bilateral hydronephrosis is present. In late cases the kidneys are destroyed, and now the picture is that of a bilateral pyonephrosis and pyoureter. The urine nearly always contains a great deal of pus, many bacteria, and microscopic blood. If residual urine is present its reaction is strongly alkaline.

The most common obstructions of the posterior urethra and vesical neck are contracted vesical neck, posterior urethral valves, cysts and hypertrophy of the verumontanum.

Contracted vesical neck.—This type of obstruction has been recognized for a long time. It is due either to a muscular hypertrophy or a fibrosis of the vesical neck. Occasionally this lesion is associated with obstructing folds of mucous membrane. Urinary difficulty from birth should make one consider the possibility of a contracted vesical neck, and the proper urological investigation should be carried out. The importance of early recognition is obvious. In the routine examination of the genito-urinary system it may be found that a soft rubber catheter, even a French No. 8, will meet obstruction at the vesical neck. It may be necessary to use a filiform to overcome this. Large quantities of infected residual urine, which is usually alkaline, may be withdrawn.

A cystogram will reveal trabeculations and diverticula (Fig. 10), and very often there is evidence of reflux up one or both ureters, which are usually markedly dilated (Fig. 11). The obstruction may be removed either by repeated dilatations with sounds or by resection. At times both methods are used.

Valves of the posterior urethra.—Posterior urethral valves are quite common, and the lesion should be considered in all cases of urinary difficulties in male children. Young,¹⁵ in 1912, observed the first case cystoscopically and removed the obstruction by operation. Several cases have been reported since. In 1934 Lowsley and Kirwin⁹ reported 133 cases. In 1937 Fagerstrom⁶ collected 10 additional cases and added 4 of his own, making a total of 147.

We have observed one case at the Children's Memorial Hospital.

The valves vary in size and shape. They may consist of simple mucosal folds or ridges or they may take the shape and form of definite fibrous diaphragms. Young and McKay¹⁴ report three distinct types.

The diagnosis of urethral valves can be made by cysto-urethroscopy. At the same time the bladder will show trabeculations, diverticula, and marked inflammation. Pyelography, whether retrograde or intravenous, will usually reveal large dilated ureters and renal pelvises.

When treatment of these children is considered, the same principles that are applied to men suffering with chronic urinary retention must be observed. The bladder must be emptied gradually and drainage continued until the renal function improves. This may usually be done by an indwelling soft rubber catheter, although occasionally a suprapubic drainage may be necessary. The patient must be given large quantities of fluids, and other forms of elimination are to be carried out. When the general condition of these children improves, as evidenced by better kidney function, cleaner urine, improved appetite, and gain of weight, the question of surgical interference may be considered. The object of the treatment is the removal of the obstructing valve. In the majority of cases fulguration of the obstruction through the operating cystoscope is the ideal method of approach. In rare instances, where urethral instruments cannot be passed, the valves may be removed through a suprapubic cystotomy. Some surgeons advocate urethral dilatation only. In our case fulguration through the operating cystoscope was successfully carried out.

Cyst of the posterior urethra.—This condition must be very rare. Campbell does not mention the condition in his papers. Eisendrath and Rolnick just refer to the congenital valves and hypertrophy of the verumontanum in children. Our reason for mentioning the lesion is that we have encountered such a case. The diagnosis was made at autopsy. The clinical history and findings were those of a posterior urethral obstruction with severe renal destruction, insufficiency and infection. Dr. Chase,³ of the Department of Pathology, Royal Victoria Hospital, has made a thorough study of the case, and

believes that the cyst resulted from a congenital stenosis of Cowper's duct.

Hypertrophy of the verumontanum.—This lesion is less common than urethral valves. The condition is very often undiagnosed, and several cases have been observed at autopsy. Cases have been discovered in stillborn children, and were associated with bilateral hydronephrosis and hydroureter, and destroyed bladders.

SUMMARY AND CONCLUSIONS

1. Obstructive lesions of the urinary tract in children are usually congenital, resulting from anomalous development.
2. Obstructions in children are found both in the upper and lower urinary tracts.
3. All children with pyuria should have a thorough urological examination.
4. The importance of early recognition and treatment of urinary obstruction is stressed.
5. Treatment of urinary obstruction must be instituted before advanced destructive damage to the genito-urinary tract has taken place.
6. The most common obstructive lesions of the urinary tract in children are discussed.

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UNUSUAL MALIGNANT CONDITIONS OF THE SKIN*

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THE following cases were chosen primarily to present lesions of large size which might occasion difficulty in determining the method of treatment. While all were treated by irradiation only, no attempt is made to undervalue other methods of treatment which may give equally good results, but it is thought well to emphasize that the progress made in each case was eminently satisfactory.

CASE 1

Wm.K., aged 83, with a malignant lesion involving the right lower lip.

History and examination.—It began 25 years before as a small fissure, healing at intervals for a few weeks at a time only. On presentation for treatment there appeared on the right lower lip a heavily infiltrated ulcer the size of a shelled almond, the whole lesion being about the size of an almond nut. There was one large submaxillary gland, freely movable, which had been present for years. *Biopsy report.*—Squamous cell carcinoma (Broders, Grade I).

Treatment.—Combined radon and deep x-ray therapy. Eight 1 millicurie gold radon seeds were inserted into the growth, making a total of 8 millicuries; deep x-ray therapy to both sides of neck—with 1 mm. each of aluminum and copper at 50 cm., distance 200 KV and 20 MA for 16 minutes. Four hundred R-units were given to each side of the neck over a period of ten days, making a total of 1,200 R-units to each side of the neck.

CASE 2

Mrs. T., aged 70, with a malignant lesion of the left cheek below and in front of the external auditory meatus.

History and examination.—This began two years before as a small hard lump without any head. It did not break down until a few months before the patient presented herself, and she had only sought medical advice recently. On examination there was a raised discharging area with crusts, in all, the size of half a walnut, on the left side of the face in front of and below the external auditory canal. *Biopsy report.*—Fibro-sarcoma.

Treatment.—Radium, x-ray and radon. Following the application of boracic compresses for 24 hours a plaque of radium was applied with 1 mm. platinum filtration and 4-ply rubber for 720 mg. hours. When seen six months later the primary lesion was healed, but there was present in the upper corner and bulging in the canal of the left ear a hard mass about the size of a small olive. Deep x-ray therapy was applied, using 200 KV with 20 MA at 50 cm. distance, filtered through 1 mm. of aluminum and 2 mm. of copper, for 14 minutes, giving 210 R-units at each exposure. These treatments were given over a period of 24 days for a total of 2,940 R-units.

When seen two months later deafness was about complete in left ear. Two months later some swelling

and induration were present in front of left ear, quite tender, with bulging into the anterior wall of the canal as a hard firm adherent mass, in all about the size of an almond nut. Five 1 millicurie radon seeds were inserted, 2 in the meatus and 3 outside beneath the growth, and 4 additional x-ray treatments as above given in the area, totalling 840 R-units over 4 days.

CASE 3

Wm.F., aged 70, with a malignant lesion involving the right side of the head.

History and examination.—The primary condition began 20 years before the patient presented himself for treatment, as a small pimple on the right temple irritated at times by scratching with a pencil. About 2 years before the lesion had become crusted and broken down. On presentation for treatment there was a large area on the right side of the head, about 4 x 5 inches, with spreading margins crusted and scaly and a tendency to spontaneous healing in centre. *Biopsy report.*—Basal cell carcinoma.

Treatment.—This consisted of superficial x-ray, using 130 KV with 5 MA at a distance of 14 inches through 4 mm. of aluminum for 10 minutes. Six of these treatments were given over a period of seven weeks, in all, 1,440 R-units. Two months later the lesion appeared to be completely healed and replaced with soft pliable scar, but when seen a month later a few minute lesions had reappeared. Six more similar treatments were given over a period of 10 weeks of 1,440 additional R-units, making a total of 2,880 R-units during a period of 7 months.

CASE 4

J.B., aged 63, with a large warty growth involving the whole lower lip.

History and examination.—The patient stated that the condition began two years before as a small whitish spot on the inside of the lower lip. It had been treated by a local physician with white salve one and one-half years before. On presentation there was a large warty fungating growth, which began on the right side of the lower lip, spreading rapidly the previous four months and now involving the whole lower lip. *Biopsy report.*—Squamous cell carcinoma (Grade I, Broders).

Treatment.—Combined radon and x-ray. Gold radon seeds, to the amount of 15.96 millicuries, were inserted throughout the growth. Using the deep x-ray therapy machine, the following treatments were given, with 200 KV 20 MA at 50 cm. distance through 1 mm. aluminum and 2 mm. copper; exposure time 20 minutes. These treatments were given to the lip and cervical regions, alternating between the right and left side over a period of 7 days—a total of 1,800 R-units. Reducing the time factor from 20 minutes to 14 minutes, 8 additional treatments were similarly given over the next 9 days, with a total of 1,680 R-units. This amounted to a sum total of 3,480 R-units, given over a period of 16 days.

When seen in May, 1937, six months after the beginning of treatment, there appeared to be perfect healing of lip with a gain in weight by patient of 25 lbs.

CASE 5

J.M., aged 65, with an extensive ulcerated mass involving the whole chin.

History and examination.—The patient appeared first for treatment in May, 1930, with a history of onset

* A paper read at the Sixty-eighth Annual Meeting of the Canadian Medical Association, Section of Dermatology, at Ottawa, June 24, 1937.

a few years earlier. On examination there was a nodular, bleeding, necrotic, foul-smelling area with rolled borders, nearly one inch deep, involving practically the whole chin.

Treatment.—May, 1930, applied 165 mg. of radium in 8 capsules over a heavy dressing for 10 hours, a total of 1,650 mg. hours.

July, 1930, two months later there was very little change. A similar application of radium, 165 mg., was applied for 12 hours, a total of 1,980 mg. hours.

When seen one month later, in August, 1930, there was marked improvement, with the growth receding to

about one-half of its original size. A similar application of radium was made, totalling 2,400 mg. hours. Seen four months later, in January, 1931, the condition was almost healed, when an additional application of screened radium was applied, 175 mg. for 12 hours, totalling 2,100 mg. hours. When seen in April, 1931, eleven months after the beginning of treatment, the growth was completely healed.

CASE 6

I.E., aged 74, with a pigmented area on the right cheek.



History and examination.—About 7 years before the patient presented himself for treatment a pigmented area appeared on the right cheek, and seven months before he presented himself a pimple-like projection formed on the upper nasal side, and one month before presentation this projecting area began bleeding. On examination there was a pigmented flat soft area, very dark, in all about the size of a 50c. piece. At the inner and upper border there was a raised area about the size of a pea which showed evidence of recent bleeding. *Biopsy report.*—Melanotic sarcoma.

Treatment.—A surface plaque of radium was applied in September, 1935, with 1 mm. of platinum filtration and 4-ply rubber for 1,200 mg. hours. Seen three weeks later there was a heavy reaction; the lesion appeared to be perfectly healed when examined a month later. Up to the present no evidence of secondaries is apparent.

CASE 7

A.J., aged 57, with a malignant lesion on the left side of the face.

History and examination.—The beginning of the lesion dated back to 1929. The patient had consulted many physicians, undergoing previous treatment by five. Examination revealed a large, open, undermined foul smelling lesion, about 2½ inches in diameter, with a raised border just anterior to the left ear.

Treatment.—X-ray, with superficial x-ray machine, using 4 mm. of aluminum at 12 inches distance, with

130 KV and 5 MA for 20 minutes. Four treatments were given over a period of 7 days, a total of about 1,900 R-units. Seen three months later, the lesion was reduced to the diameter of one inch, and healing. When seen in another three months it was completely healed.

CASE 8

Alex.B., aged 45, with a large elevated tumour to the right of the centre of the back, giving the appearance of a fibroma.

History and examination.—The growth began about 7 years before patient first presented himself, as a small hard lump, seeming to disappear at first under application of iodine, only to reappear again, with recent marked enlargement. On examination there was a large, firm, elevated, hard, finely vascular mottled pinkish tumour about four by seven inches. *Biopsy report.*—Epithelioma adenoides cysticum.

Treatment.—Superficial x-ray, using 130 KV, with 5 MA at 12 inches distance, through 3 mm. aluminum, for 8 minutes. Six exposures were administered, spread over 10 weeks, amounting to approximately 7 erythema doses.

Two years afterwards the growth was completely gone, and the skin normal. The seat of the growth could scarcely be made out.

I take this opportunity to thank Dr. R. K. Paterson, Director of the Tumour Clinic, Ottawa Civic Hospital, for so generously supplying records and photographs.

THE PRESENT STATUS OF INTRAVENOUS ADMINISTRATION OF PENTOTHAL SODIUM IN INSTITUTIONAL AND PRIVATE PRACTICE*

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INTRAVENOUS anæsthesia^{1, 2, 3} was introduced in France in 1872, and since then so many promising agents proved ineffective, dangerous, or both that the method fell into disrepute. A revival of interest occurred on the introduction of some of the first of the soluble barbiturates, such as phenobarbital sodium, dial, sodium amytal, pentobarbital sodium and many others. Thousands of successful anæsthesias were reported, but it soon became apparent that the action of these barbiturates was too long and that they therefore were not good anæsthetic agents. The prolonged post-operative sleep which resulted was not only undesirable in itself but tended toward the production of pulmonary and other complications. In many instances varying degrees of excitation attended the awakening from this prolonged sleep, occasionally necessitating restraint. Obviously, such sequelæ were very undesirable and resulted in a rapid decrease in the use of the longer-acting barbiturates as anæsthetic agents.

During recent years two new soluble⁴ barbiturates have been introduced, namely, evipal soluble (sodium n-methylcyclohexenyl methyl malonyl urea), which was introduced in Germany as "evipan", and pentothal sodium^{5, 6, 7} (sodium ethyl 1-methyl butyl thiobarbituric acid). Both of these agents have a short action, recovery of consciousness occurs rapidly after their administration, and they cause few of the undesirable after-effects produced by their predecessors. The clinical application of these agents bore out the results obtained experimentally, and the earlier results have been confirmed by a long series of cases in which these agents have been used successfully. In action, pentothal sodium and evipal soluble are very similar. Pentothal sodium has been estimated to be between 30 to 50 per cent more potent than evipal soluble, but there is apparently no corresponding increase in toxicity. This agent therefore produces better anæsthesia for a wider range of surgical procedures than does evipal soluble. The recovery from the effects of pentothal sodium is also attended by fewer instances

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of post-operative excitement and muscular phenomena. Therefore, the object of this paper will be an attempt to elucidate the present conception of anaesthesia produced by the intravenous administration of pentothal sodium and to draw particular attention to the scope of this agent as a surgical anaesthetic, the indications and contraindications for its use and the variations in its use in the hospital and in general practice.

Pentothal sodium^{8, 9, 10} was introduced clinically in June, 1934, by Lundy, and the results to date are based on its administration in more than 7,000 cases. It is supplied in ampoules containing 1 g. (15 grains) of the drug in the form of a finely divided yellowish powder which is readily soluble in water. Its chemical formula resembles that of pentobarbital sodium except that it contains a sulphur atom. The solution for injection is made with triple distilled chemically pure water; 1 g. of the drug is dissolved in 20 c.c. of the water, to make a 5 per cent solution.

METHOD OF ADMINISTRATION

Some years ago Lundy introduced the intermittent method of injecting barbiturates intravenously. This cast a different aspect on the flexibility and safety of anaesthesia produced by intravenous injection. This holds true not only for the newer short-acting barbiturates but also for the older and long-acting ones. Obviously, the method of injecting a single anaesthetic dose that was calculated from the patient's weight, age and physical condition was highly erroneous. It is a well-known fact that two patients of similar weight, age and physical condition may have entirely different tolerances for any given barbiturate. A dose which may be barely adequate for a certain patient may easily be an overdose for another. Lundy's method consists in maintaining the needle in the vein; following administration of the initial dose subsequent small doses may be instantly administered as the anaesthesia becomes lighter. When this method is used and when the signs of anaesthesia are observed carefully the anaesthesia is not likely to become dangerously deep. Pentothal sodium is thought to be detoxified rather rapidly by the liver. The fact that a patient begins to react and the anaesthesia become lighter soon after the injection of a moderately sized dose means that the drug has already been partially detoxified and that its anaesthetic action has been

spent. If the subsequent dose is not administered until this time there is little danger of cumulative effect and overdosage as the previous dose will have been almost detoxified. This principle holds throughout the course of subsequent injections, and the patient may be maintained in the same plane of surgical anaesthesia for a considerable time. The details of the method will be considered later.

PREMEDICATION

For operations which are expected to be of short duration all premedication may be withheld. Such procedures as the opening of abscesses and extraction of teeth are examples. When no premedication is used recovery of consciousness is much quicker than it is otherwise, and the patient often is awake as soon as the operation is completed. When a rather prolonged anaesthesia is necessary premedication is desirable, as a lesser amount of the anaesthetic agent will be required. For the patient of average weight and physical condition $1\frac{1}{2}$ to 3 grains (0.097 to 0.2 g.) of pentobarbital sodium (nembutal) are administered orally three-quarters of an hour to one hour before the operation. A half hour before operation $\frac{1}{6}$ grain (0.01 g.) of morphine sulphate and $\frac{1}{150}$ grain (0.0004 g.) of atropine sulphate are administered by hypodermic injection. The dose of pentobarbital sodium or morphine may be decreased or completely withheld if the condition of the patient warrants it. I believe that in the average case there is no contraindication to the oral administration of one barbiturate previous to the administration of another by vein. While it is true that both the morphine and the pentobarbital sodium will permit the anaesthetist to use a much smaller dose of pentothal sodium than otherwise would be required, the method just described permits the anaesthetist to administer only the dose necessary to produce the desired plane of anaesthesia and he need not worry about a cumulative effect.

PREPARATION OF THE PATIENT

A vein in the cubital fossa or on the back of the hand usually is selected. The arm is supported by a well-padded arm board in a comfortable position, and it may be held in place by a strip of adhesive tape. The veins in the foot and ankle are also a convenient site of injection and may be preferable to the veins of

the arms when the operative procedure involves the thorax. One should choose the extremity which will take the anaesthetist as far as possible from the operative field and out of the way of the surgeon and his assistants. Care should be taken to see that the extremity is not constricted above the site of injection, as this will delay the anaesthesia, and when the constriction is removed an overdose will be released into the circulation. When the patient is lying on his side it is better not to use the arm he is lying on for the injection as the circulation may be poor in this arm.

The site of injection having been decided on, the part is prepared with 70 per cent alcohol, tincture of metaphen, or merthiolate 1:1,000, and the extremity is draped under the usual aseptic precautions. When the veins stand out well, manual compression will be sufficient as a tourniquet; otherwise, a tourniquet may be required. When the veins are very small¹¹ or apparently absent it may be necessary to wrap the extremities, from above the elbows to the finger tips and from above the knees to the toes, in hot moist Turkish towels covered with oiled silk for half an hour before the operation. This will usually render the veins palpable, but warm alcohol should be used for sterilization, as cold alcohol will again cause them to disappear. Attention to such details will often prevent what otherwise might be a failure.

A 20 c.c. glass syringe of the Luer type is suitable. The outlet should be offset to facilitate venipuncture. The 5 per cent solution of pentothal sodium may be made up previously and the syringe and needle may be wrapped in a sterile towel and kept ready for immediate use. If several patients are to be anaesthetized in one morning several solutions may be made up. I do not hesitate to use a solution which has been made up for six or seven hours, provided it is not cloudy or discoloured. There is no evidence of decomposition up to this length of time or for several hours afterward, which shows that the solution is relatively stable. I do not see the necessity for any more complicated apparatus than a syringe and needle. Various complicated syringes which have attachments for administering saline infusion and which may be fastened to the extremity have been devised. The syringe and needle may be held in place for as long as three hours without

any great inconvenience to the anaesthetist. With one hand the needle and syringe may be held in place leaving the other hand free for making the injection and palpating the pulse. If the patient moves his arm at any time it is much easier to maintain the needle in the vein if it is held manually. In addition to this the presence of the anaesthetist's hand on the patient's arm readily informs the anaesthetist of increasing muscle tone and beginning movements.

The question of the necessity for someone at the patient's head is frequently raised. For short operations which result in little loss of tone, this is unnecessary; for longer operations, it is essential. Any competent nurse can support the jaw, look after the maintenance of the airway, and check the blood pressure. For all lengthy operations in which this method is used the patients should be in hospital; here it is not difficult to obtain a nurse to sit at the patient's head and attend to the above details.

DOSAGE

Following venipuncture, an injection of 2 to 3 c.c. of the solution is made and the patient is instructed to begin counting slowly. The average adult patient will probably count to fifteen. While a rapidly injected initial dose will cause the patient to cease counting at between seven and ten, this is not as desirable as a slower injection. Having the patient count not only indicates when he is asleep but gives an idea of his tolerance to the drug. A patient who counts up to thirty or forty will likely have a high tolerance and will therefore require more of the drug than will one who counts only to ten. Lundy's¹² method of placing an absorbent cotton or tissue paper "butterfly" over the nose and mouth of the patient immediately following the induction of anaesthesia is an important step toward facilitating the observance of the presence and degree of the respirations. The barbiturates are all respiratory depressants and the degree of depression is a valuable guide to the depth of anaesthesia. As anaesthesia deepens the respirations become progressively more shallow, and, conversely, as anaesthesia becomes lighter the respirations deepen. Should an excessive dose be given respiratory arrest will likely occur. No single injection should be of sufficient size

to depress or arrest the respirations markedly. If one strictly adheres to this rule there is slight danger of getting into difficulty. By watching the movements of the "butterfly" one is not likely to go wrong as to the condition of respiratory function. Should the surgeon be operating about the head the excursions of the abdomen can be used as an indication of respirations if the respiratory passages are patent. The indication for an additional dose may be ascertained in one of two ways. As the respirations become markedly deeper it is a positive sign that the anaesthesia is becoming light. From 0.5 to 1 c.c. of solution injected at this time will bring the average patient back to the previous plane of narcosis. The second method, which is more suitable for the less experienced anaesthetist, is to wait until the first slight sign of increasing muscle tone, movement of an extremity, or slight moaning occurs, and then to inject the next dose, which will require to be slightly increased, probably from 1 to 1.5 c.c. With experience one learns to estimate accurately the tolerance of the individual patient and can adjust the dose accordingly. The analogy to the administration of ether by the drop method is very applicable here. The longer the duration of the anaesthesia, the smaller the subsequent doses will become. In the main, aged, debilitated and very sick patients require the minimal dose of the drug to produce satisfactory anaesthesia; robust, muscular, healthy young adults require the maximal dose. The maintenance of an adequate airway is of the greatest importance. For procedures in which very little relaxation is necessary the breathing is usually unobstructed as in natural sleep. In those in which the anaesthesia is somewhat deeper support of the jaw will usually suffice. Occasionally, it is necessary to insert an artificial airway, particularly in the case of elderly patients without teeth.

The induction of anaesthesia with pentothal sodium is practically devoid of excitement. An interval of from 30 to 45 seconds should elapse before the operation is begun, for the maximal effect of the drug to take place. The maintenance of the anaesthesia can be made smooth if this technique is used. Should the anaesthesia even become so light that the patient cries out, one may be assured that he is not conscious of

pain, because of the period of amnesia which occurs during awakening. The signs denoting surgical anaesthesia, other than those referable to respiratory function, are not too reliable. The pupils may be contracted or moderately dilated. The lid reflex, while usually absent, may show some reaction. While relaxation of the jaw is a rather reliable guide to surgical anaesthesia, many cases have been observed in which it was accompanied by little or no relaxation of these muscles. Therefore, I believe that the most reliable sign of the state of anaesthesia is obtained from close observance of the respirations. The pulse rate may be slightly increased. The systolic blood pressure may drop on an average of from 10 to 20 mm. of mercury in a case in which the blood pressure is normal, but it quickly returns to the previous level. In those cases in which there is persistent essential hypertension a drop in blood pressure of from 30 to 70 mm. of mercury may take place. This phenomenon is taken advantage of in the pentothal sodium test for essential hypertension.¹³ The drop in blood pressure which occurs under pentothal sodium anaesthesia is equivalent to the drop which may be anticipated following a sympathectomy. In cases in which an adequate drop in blood pressure has been obtained by this test operation may be performed with reasonable assurance of a good result.

The 5 per cent solution of pentothal sodium does not appear to increase or decrease the coagulation time of the blood or the tendency to haemolysis. Clotting within the needle occurs but rarely, even following long intervals of injection. This can be entirely circumvented if the needle is occasionally cleared by minute injections. The solution in this concentration is only slightly irritating to the tissues should extraveneous injection occur. If this happens it is well to massage the region thoroughly with an alcohol sponge, and should a large amount have been injected hot moist compresses should be applied to the region following the patient's return from the operating room. Venous thrombosis at the site of injection has occurred in only a very few cases.

ANALEPTICS

Theoretically, a respiratory stimulant is the logical antidote for the barbiturates. Lundy suggested adding coramine (a 25 per cent solu-

tion of pyridine betacarboxylic acid diethylamide) to the solution of pentothal sodium, in the hope that the coramine would partially combat the respiratory depression and render respiratory movements more visible. Each c.c. of the combined solution contained approximately 50 mg. of pentothal sodium and approximately 12.5 mg. of pyridine betacarboxylic acid diethylamide. Although the amount of respiratory stimulant was small it was felt that it might stimulate respiration slightly without producing an antagonistic effect and lighten the depth of anaesthesia. In about 2,000 of the total number of cases in which pentothal sodium has been used at the Mayo Clinic the combined pentothal-coramine solution has been employed. Up to the present time it has been difficult to formulate our results but it has been thought that in light anaesthesia there was some respiratory stimulation, especially if premedication with morphine and pentobarbital had been employed. Animal experiments corroborated what we noted clinically, but it was further proved by experiments with animals that if an overdose of pentothal sodium was administered and respirations were stopped the stimulating effect of the so-called stimulant was variable. Assuming that an overdose of barbiturate is "locked" in the lipoids of nerve tissue, it is not hard to assume that even large doses of an analeptic would under these conditions have no effect. This bears out the reason for our strict attention to respiratory function. We believe that the use of an analeptic in the anaesthetic solution may have still further possibilities and we hope to report further on this question.

POSTANÆSTHETIC PHENOMENA

Recovery from pentothal sodium anaesthesia occurs as it does from natural sleep. Nausea and vomiting are practically absent and many patients have eaten their regular meal a short time after an anaesthesia for some minor procedure. Following operations of short duration the patient is awake and responsive before he leaves the operating room. It has been in only a few rare cases, and following the administration of large doses, that sleep has lasted longer than twenty to thirty minutes. Excitement and muscular phenomena, such as twitching, which are noted after the use of some other barbiturates, are essentially absent, although some nervous patients may cry and be somewhat dis-

turbed for a short time. Following the administration of large doses patients will be unsteady and "groggy" for one to two hours, but following initial recovery they usually fall asleep and awake refreshed. No remote complications or effects have been noted at the Clinic.

The total dose used for any given procedure varies a great deal in different patients. At the Clinic we have in the past advised a total maximal dose of 1 g. of pentothal (20 c.c. of a 5 per cent solution) but recently have felt that this can be safely increased up to 1.5 g. or more if the described method of injection is strictly followed. We have administered as much as 3 g. to a patient and have seen no ill effects. Operations under this type of anaesthesia have occasionally lasted as long as three and a half hours.

INDICATIONS AND CONTRAINDICATIONS

From the results we have obtained I feel that our enthusiasm for this method of anaesthesia is justifiable. This is in part due to the method of administration, to the recognition of the contraindications, and to a refusal to use the method for surgical procedures beyond its useful scope. The method, while admirable in many types of cases, is absolutely unsuitable and inadequate in others, and if one uses it thoughtlessly in unsuitable cases one both endangers the patient and complicates the operation. The variety of surgical procedures for which it may be the best anaesthesia is large; other valuable methods are available in cases in which it is not applicable. One cannot stress too strongly the following contraindications.

Pentothal sodium should not be administered to children who are less than eight to ten years of age, as it is a respiratory depressant and the trachea and bronchi of such children are small. In certain cases it may be given to a child of seven or eight years of age for some minor procedure, provided minute doses and cautious administration are used. People of extreme age tolerate the drug well, provided the cardiac and respiratory systems are in rather good condition. It is not contraindicated for debilitated and very sick patients, but much greater caution must be used in the administration, and the effective dose will be much smaller than that given to healthy patients. Because of the depressant effect on respiration the drug is

definitely contraindicated in the presence of pulmonary disease that reduces pulmonary ventilation. Likewise, any marked degree of cardiac insufficiency contraindicates its use. Moderate renal involvement does not constitute a contraindication. However, when the kidneys are markedly involved it is preferable to use another form of anaesthesia as the disintegration products of the drug are thought to be excreted by the renal system. Theoretically, the drug should not be used in the presence of hepatic insufficiency, as it is believed that the drug is detoxified in the liver. I have not been aware of any marked cumulative effect in cases in which the hepatic function has been subnormal. I do think it advisable as yet, however, to withhold its use when there definitely is marked hepatic disease. There are a few patients, especially young muscular adults, who appear to be particularly resistant to the drug; after the administration of 0.5 to 0.75 g. of the drug anaesthesia is insufficient to permit incision of the skin. In the few cases in which this may be noted it is preferable to discontinue the injection and use another method. The drug is not suitable for certain types of operations. In safe doses it will not obliterate the pharyngeal and laryngeal reflexes, and therefore it is unsuitable and dangerous for operations about the throat, such as tonsillectomy. It is also dangerous for operations about the nasal and oral passages when any amount of blood or infected secretion is present. Doses within the limits of safety will not obliterate the abdominal and peritoneal reflexes; therefore the drug may not be safely used as the only anaesthetic for intra-abdominal operations. When this method of anaesthesia is used it is rarely possible to pass a Magill intratracheal tube through the glottis, but the chances of intubation are greatly facilitated if the throat has been sprayed with a local anaesthetic, such as a 10 per cent solution of cocaine or a 5 per cent solution of butyn. If such a condition should arise and the throat has not been sprayed it will be preferable to spray it before intubation. Pentothal sodium should not be administered intravenously where the facilities for administering oxygen and carbon dioxide are not readily available. Airways and other necessary equipment should also be at hand. The instances in which it may be used in the

doctor's office will be considered subsequently.

From the standpoint of the patient the method could hardly be more satisfactory. Both the induction and the recovery are usually unnoticed by the patient, and he hardly realizes that he has had an anaesthetic. The freedom from nausea and vomiting is much appreciated. The surgeons appreciate the time saved during induction and the fact that the anaesthesia produces little or no after effects.

Pentothal sodium can be used to supplement any other type of anaesthesia without producing any untoward effect and with decided advantage in certain cases. For the patient who dreads induction by inhalation methods, an initial dose of pentothal may be given and the inhalation started as soon as he is asleep. When a patient has some facial defect which makes a tight fit of the mask difficult anaesthesia may be induced with pentothal sodium and maintained with ether administered by the drop method. There also are many possibilities for the combination of local and regional procedures with intravenous anaesthesia. It is possible to perform abdominal operations provided a thorough block of the abdominal wall has been done before the administration of the intravenous anaesthetic.

THE PRACTICAL SCOPE OF THE METHOD

Table I shows the increase in the use of pentothal sodium at the Clinic from 1934 to 1936 inclusive. This shows that pentothal sodium was used in 4,119 cases up to the end of December, 1936. At the time this paper was written it had been used in more than 7,000 cases. The

TABLE I.
INTRAVENOUS ANÆSTHESIA WITH PENTOTHAL SODIUM

	1936	1935	1934
Operations on brain, spinal cord, and peripheral nerves	177	76	3
Operations on eye	89	52	20
Operations on head and neck (other than above)	339	276	9
Dental extractions	22	32	2
Transurethral and cystoscopic operations and manipulations	834	458	25
Orthopaedic operations	137	44	1
Operations on thorax, thoracic wall, breast, and axilla	291	158	1
Intra-abdominal operations	139	57	7
Operations on abdominal wall and for hernia	50	23	
Gynaecological operations	578	147	4
Operations on anus	57	10	1
Total.....	2,713	1,333	73

drug has been used for the following operative procedures.

Operations on the brain, spinal cord and peripheral nerves.—These included extensive procedures such as craniotomy for abscess of the brain, trephination of the skull, elevation of depressed fractures, encephalography, avulsion and suture of nerves and many other types of operation. In many cases the anaesthesia has been maintained for as long as two and a half to three hours. In addition it has been employed for such external procedures about the skull as the suturing of lacerations of the scalp. In many of these cases the electrocautery is used and the use of pentothal sodium does away with any danger of fire and explosion. This is also true in other operations in which the cautery is employed.

Operations about the eye.—These operations have been a particularly practical field for the use of the drug. Enucleations can be performed successfully, as can operations about the lachrymal apparatus and eyelids. Operations for cataracts in cases in which the patients are nervous can be carried out in a satisfactory manner, the method being particularly valuable in cases in which the conjunctiva is badly congested and instillation of a local anaesthetic may result in inadequate anaesthesia.

Operations about the head and neck.—Most plastic operations about the head and neck, even though of long duration, can be done more advantageously with pentothal sodium than with other methods of anaesthesia. It removes the anaesthetist and his equipment from the operative field and lessens the danger of contamination. Very small amounts of the drug need be used if a little local infiltration is used at the same time. The patient may usually be anaesthetized so lightly that any artificial airway is unnecessary. The method is particularly practical for the electrocoagulation of epitheliomas about the head and neck. Among other procedures one could mention insertion of radium, skin grafting, the cutting of tube and pedicle grafts, and the emergency suture of wounds in this region.

Dental extractions.—Pentothal sodium may be used for difficult extractions of from one to three teeth in cases in which the patients dread local anaesthesia or are sensitive to a local anaesthetic. As the procedure is of short duration

the patient is usually awake shortly after the operation is completed.

*Transurethral and cystoscopic operations and manipulations.*¹⁴—The method has displaced low spinal and sacral anaesthesia to a great extent in this field. It is well tolerated by elderly patients, and many of the shorter transurethral prostatic resections are done completely under this form of anaesthesia. In some operations which last more than one hour only 1 gm. of the drug will be required. Other procedures in which this method has been used include cystoscopic examination, catheterization of the ureters, manipulation of ureteral and vesical stones, and coagulation of bleeding points in the urethra or bladder. The method also may be used for litholapaxy.

Orthopaedic operations.—These are too numerous to mention. Relaxation is adequate for the reduction of fractures and dislocations and other emergency procedures. Other procedures include manipulation of ankylosed joints, ganglionectomy, curettage for osteomyelitis, and so forth.

Operations about the thorax, thoracic wall, breast and axilla.—All surgical procedures on the breast, from biopsy to radical amputation, may be done under intravenous anaesthesia. For radical amputations, however, an inhalation anaesthetic may be preferable. Thoracoplasty and other plastic work on the thoracic wall may also be mentioned.

Intra-abdominal operations.—At the clinic we do not advocate doing abdominal operations under intravenous anaesthesia, but in certain instances it may be justified if the intravenous anaesthesia is combined with a block of the abdominal wall.

One may cite a case in which an elderly male patient had a gastric condition which had been diagnosed as carcinoma. A few days before operation he had a pulmonary infarction and inhalation anaesthesia was considered inadvisable. Due to a low value for the haemoglobin we did not wish to use spinal anaesthesia, so, following a thorough block of the abdominal wall with 250 c.c. of a 0.5 per cent solution of metycaine which contained epinephrine, the patient was given pentothal sodium intravenously. The exploration revealed an operable carcinoma of the stomach and a subtotal gastrectomy was done. The operation lasted forty-five minutes and 18 c.c. (900 mg.) of the solution of pentothal sodium were administered. Relaxation was adequate for closure, the patient left the operating table in good condition, and three weeks later he was making an excellent recovery.

This case is cited to demonstrate what may be done under certain conditions. Most opera-

tions on the abdominal wall, such as secondary suture of wounds, can also be done under this type of anaesthesia.

Gynecological operations.—The method has proved most useful for such operations as dilatation and curettage, vaginal hysterectomy, plastic work about the perineum, and, in fact, most of the extra-abdominal gynecological operations. Perineorrhaphies of one hour's duration are frequently performed.

Operations about the anus.—Pentothal sodium produces sufficient relaxation of the anal sphincter to permit anal dilatation, excision of a fissure, hæmorrhoidectomy, and is well suited for proctological examinations and the fulguration of rectal carcinomas. We employ it in the few cases in which sacral block is contraindicated. Under a very small injection, rectal packs are easily removed.

Miscellaneous procedures.—We have found this method to be of use in painful vaginal examinations, removal of packing after posterior resection of the rectum, closure of colonic stomas, and in certain medical cases in which a prompt but transient effect is desired.

COMMENT

These instances give an idea of the variety of surgical conditions which may be handled under pentothal sodium anaesthesia with satisfaction to the surgeon and the patient.

This series of operations was done in hospitals in which the equipment for meeting any emergency was at hand. I am frequently asked about the possibilities of the drug for office use by the general practitioner. Certainly no operations of any marked duration should ever be performed in the office or the home unless the anaesthetic is administered by a competent anaesthetist who carries emergency equipment such as oxygen and carbon dioxide with him. However, if the general practitioner becomes familiar with the properties of the drug, its method of administration, and its potential dangers, he may safely use it in the office when a light transient anaesthesia is desired, such as would be needed for opening abscesses, and in other minor surgical conditions which do not last more than five minutes. In addition, no physician should attempt to use the method in his office unless he has facilities for allowing

the patient to lie down for at least an hour or more following recovery. Even patients who appear absolutely awake and normal when lying down may be both dizzy and unsteady when they get on their feet. If allowed to leave the office too soon or unaccompanied they are very likely to have some serious accident which will cause complications both for the patient and for the doctor from a medico-legal standpoint. In any event, these patients should never be allowed to go home unaccompanied.

Inexperienced persons should learn the properties and use of the drug and see it administered before they attempt its administration themselves. Lastly, the beginner who has performed a few successful operations under this type of anaesthesia and is highly enthusiastic about his results is warned against its use in cases in which it may be contraindicated, inadequate, or both.

SUMMARY

Anaesthesia produced by using a 5 per cent solution of pentothal sodium intravenously is a method which is both safe and useful in a wide field, provided that the drug is correctly administered in suitable cases.

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FETAL RESPIRATION AND ITS RELATION TO ABNORMALITIES OF THE NEWBORN*

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THREE clinical problems involving the respiratory system of the newborn, namely, (1) asphyxia; (2) atelectasis, and (3) pneumonia, may be approached from a new viewpoint if one takes into account certain observations which show that the first respiration is not initiated at birth but takes origin far back in embryonic life. Instead of a state of prolonged apnoea, the fetus shows rhythmical respiratory movements throughout a large part of intrauterine life.¹

The intrauterine respiratory movements may be observed directly through the thin uterine wall in the rabbit. Experimental conditions essential for direct observation of intrauterine breathing for many hours involve the hormonal inhibition of labour and the elimination of anaesthetics. A typical experiment is recorded in the motion pictures (shown at the meeting). There is included also a photographic record of the respiratory movements of the human fetus which are transmitted through the abdominal wall of the mother.²

In view of the respiratory activity of the fetus long before birth it is evident that failure of respiration in the newborn, or asphyxia neonatorum, must be regarded as a suppression of previous activity rather than failure of some new mechanism to begin functioning at birth. In the apnoeic newborn child the question is not what causes the first breath but rather what factors have been superimposed to suppress the continuation of respiratory movements. With regard to the causes of intrauterine respiratory failure it may be pointed out that in rabbit fetuses showing regular respiratory movements apnoea may be induced of three different types, namely, (1) anoxaemic; (2) acapnic; (3) anaesthetic. These factors belong to the period preceding delivery. To deal with them at that time by efforts to maintain adequate oxygenation and caution in the choice and use of anaesthetic

agents would be more effective than later attempts at resuscitation.

The next question is whether or not amniotic fluid enters the lungs as a result of the respiratory movements. In order to determine the existence of a tidal flow of amniotic fluid in the respiratory tract, India ink was added to the amniotic fluid. Comparison was made of the lungs of fetuses which had been showing respiratory movements with those of litter-mates in which breathing had been suppressed by the injection of pentobarbital sodium. In breathing fetuses the lungs were blackened, while in contrast in apnoeic fetuses the lungs were normal. Microscopical examination showed carbon particles in the alveoli of the lungs of the former (even within 1 minute) but not of the latter.³

The aspiration of amniotic fluid is not an accidental complication of labour but must be viewed as a normal consequence of fetal respiration. The respiratory movements are responsible for a tidal flow of amniotic fluid into the lungs, which thus affords a mechanism for the dilatation of the future air passages. Fetal respiration thus aids in the structural differentiation of the normal lung.

Regarding atelectasis and pneumonia it is evident that the breathing of abnormal amniotic fluid before birth may give rise to both types of injury. The normal development of the alveoli may be complicated by the presence of amniotic fluid containing debris of excessive amount or abnormal type. A mechanical obstruction of bronchioles brought about during embryonic life may interfere with the normal flow into the lung of amniotic fluid and result in incomplete dilatation of alveoli, *i.e.*, atelectasis. Certain types of debris, such as cells, meconium and sebaceous matter, may be injurious not only as foreign bodies but also as chemical irritants. In view of the rapid exchange of fluid between the pulmonary alveoli and the amniotic sac, bacterial contamination exposes the alveoli to immediate invasion by a current of infected

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fluid. The pathogenesis of intrauterine pneumonia may be clearly reconstructed in many cases as a complication of normal intrauterine respiration.

One further point may be considered. Why is the newborn not drowned if the alveoli are filled with amniotic fluid at the time of birth? A clue is afforded by microscopical examination of the lungs shortly after delivery when the breathing of air has just begun. A striking dilatation of the alveoli is found in contrast to the moderate size of the alveoli before birth. The elasticity of the alveolar walls permits an increase in size of the alveoli of such magnitude that the area

now occupied by fluid becomes relatively greatly reduced.

CONCLUSIONS

Fetal respiration results in the breathing of amniotic fluid. Breathing of abnormal amniotic fluid may result in injury of the lung before birth.

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THE FATIGUE SYNDROME

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BY fatigue syndrome we mean that group of symptoms complained of by patients who experience mental or physical depletion, or both. In this discussion we do not propose to restrict ourselves to those who reveal chronic nervous exhaustion, but will discuss that group of cases with chronic fatigue which is not relieved by average rest. We include, also, the patients whose fatigue is so masked by over-activity that they themselves are unaware of it. Work of itself seldom leads to this chronic condition we are calling fatigue. It is axiomatic that worry, not work, kills. Overwork, therefore, is not a condition to be considered merely for itself but as a symptom of maladjustment. Usually it is not overwork that leads to a nervous breakdown but the nervous breakdown drives the individual to overwork. Frequently overwork is suggestive of a mental conflict. Insomnia is another instance in which the result is often mistaken for the cause.

The psychogenic factors which predispose to these symptoms of overwork, insomnia, and many other complaints are numerous and may be found in many combinations. Anything which sufficiently upsets the mental balance of a person will result in fatigue. Insecurity of home, affections, health, or employment becomes a potent emotional factor producing fatigue. Fear and worry from whatever cause point in the same direction. It is well known that any

emotional excess produces exhaustion. This may be largely the result of adrenal deficiency.

More protracted emotional states, such as we are accustomed to describe by the terms unhappiness or dissatisfaction, may reveal themselves less physiologically, but result in a more severe form of exhaustion. Frustration, a feeling of a lack of purpose in life or its incompleteness lead to chronic depletion of energy. Indecision is a great waster of energy, and has a cumulative effect which leads to a chronic inability to make decisions and to consequent self-depletion. People can tire out from monotony or from repetition of routine, especially if it is below their mental capacity. This is seen in school children who have a capacity beyond their grade, but are held back in order to fit into the routine of school life. School fatigue may not necessarily be due to an excess of lessons but may result from a continuous activity of the body and mind, such as is frequently found in boarding-schools.

An even more potent factor producing fatigue in modern life is over-stimulation; a highly stimulated person is constantly demanding more stimulation. Over-stimulation is a matter of over-awareness and too great an attempt to respond to the stimuli. Alcoholism may be another result of over-stimulation or monotony, but it is usually a means of escape rather than an end in itself. Alcoholism, the use of drugs, religious fanaticism, temper-tantrums, and sui-

cide are indicative of psychopathology. The emotional disturbances inciting these conditions frequently show themselves early, in the reaction of fatigue. The temperament of the individual plays a rôle in the expression of fatigue; a nervous temperament favours quick fatigue, and repeated fatigue makes a vicious circle by increasing nervous instability. Anxiety may be a protracted but legitimate form of worry, in that it is a search for a way out of a difficulty. There is, however, a less productive and quite as chronic form of anxiety which is expressed by abundance of activity, commonly called "fussing". "Fussing" is one of the most fatiguing forms of activity, because of lack of direction in the expenditure of energy.

All of these psychological phenomena have physiological correlates; somatic changes correspondingly alter mental states. No matter which comes first, the entire organism is involved. The difficulty which the layman, and too frequently the physician, dismisses as "just nerves" may be physiologically as well as psychologically real and important, in spite of physical findings being absent on ordinary examination.

Many endocrine disturbances also play a rôle or even the important part in the fatigue syndrome. It is well known that emotions produce circulatory and endocrine disturbances. Chronic anxiety is said to induce adrenal insufficiency.

Thyroxin has for its chief function the sensitization of every cell and organ in the body to sympathetic stimulation. This stimulation, in turn, is largely under the control of the adrenal medulla which secretes adrenalin. Thus, over-activity of the thyroid is manifested by an over-excited sympathetic nervous system, resulting in increased cellular metabolism. Hypothyroidism is often an underlying cause for the fatigue which is primarily the result of a slowing of metabolism. The signs of dry, brittle, or scanty hair, dry skin, flatulence, menorrhagia, and chronic constipation are at least as reliable in the diagnosis of this condition as is the basal metabolic rate. In the state of advanced hypothyroidism the patient becomes dull, apathetic and slow. Mild cases of hyperthyroidism, on the other hand, may also be accompanied by tiredness. Probably the explanation of this early fatigability is that the excess of thyroxin

(here generated) sensitizes the cells to adrenalin, which, in turn, depletes glycogen storage in the muscles and the liver. In physically fatigued animals fatty changes have been seen in the cortex of the adrenals. In hypoadrenalism the blood pressure is usually low and there is an increased fatigability from muscular activity. This might be compared to a very mild form of Addison's disease. In the latter there is a definite clinical syndrome of weakness, hypotension, pigmentation, and gastro-intestinal disturbances.

Dyspituitarism, especially of the anterior lobe, is frequently associated with fatigue. Some of this fatigue may arise from the lack of the nitrogen metabolic hormone which increases the specific dynamic action of proteins. The anterior lobe of the pituitary gland also acts through the fat metabolic hormone, thus increasing the fat metabolism. Besides the possible effect of hormones enlargement of the pituitary gland may press upon the sleep centre, producing an excessive drowsiness. Fatigability and weakness are given as some of the major symptoms in the Cushing syndrome of the basophilic adenoma.

Hypogonadal changes are said to be associated with fatigue. We know that after castration an animal is more sluggish. Adolescent fatigue occurring at puberty is more probably associated with a marked increase in development and weight than with endocrine disturbances. In the late stages of hyperpituitarism, hypergonadism, hyperadrenalism, and hyperthyroidism these various glands become exhausted and produce muscular weakness and early fatigability. Muscular weakness is often seen in Simmond's cachexia and Addison's disease.

Myasthenia gravis is a disease in which fatigue occurs early in the muscles. Little is known of its etiology, but it may be associated with exophthalmic goitre, and is improved by the giving of epinephrin or ephedrin. This point suggests that it is closely associated with the adrenal gland. Some writers have considered the pathology to be a disturbance of the muscular metabolism, but we have very little evidence to support this theory. Hypertrophy of the thymus has been observed, and treatment of this occasionally gives good results.

It has long been said that fat people are "lazy". It was thought that there was a close association between the laziness and the development of fat. More recent work has shown that in the obese person there is a decreased specific dynamic value of proteins and carbohydrates; in other words, such a person does not get the same energy value out of his food. On the other hand, he does much extra work in carrying himself about, and thus is fatigued more quickly. In my experience obese persons are not "lazy", but are, as a rule, hyperactive, especially if we consider their increased weight. Obesity may be due to pituitary, gonadal, thyroid, or adrenal disease. Many cases, however, are simply the result of over-eating. They are all to be ascribed to the result of excessive food intake over energy expenditure.

Often after acute infections such as tonsillitis, pneumonia, and especially influenza, there is a degree of exhaustion which is out of proportion to the apparent illness of the patient. In some of these cases it has been shown that there are hæmorrhages and areas of degeneration in the adrenal cortex. At least, some of these patients are benefited by the administration of ephedrin. Neurocirculatory asthenia is a syndrome in which fatigue, shortness of breath, and neurocirculatory disturbances are the chief findings. The underlying disturbance is an excessive stimulation of the adrenal and sympathetic nervous system. Crile has been able to improve these patients by adrenal denervation. The psychic disturbances in the etiology of this state have been sufficiently stressed. In this condition we find symptoms similar to hyperthyroidism except no increase in metabolism.

Often we find fatigue and allergy in the same patient. At the time of an asthmatic attack the fatigue in such people seems to be out of proportion to the true severity of the condition. People with allergic states do not commonly show essential hypertension or spastic changes in the smooth muscle. The absence of these suggests a hypoadrenalism as the basic defect. It is commonly recognized that liver insufficiency is often associated with mental dullness and irritability. This is probably the result of bile products in the blood. Acidosis often is associated with dullness and sluggishness. These symptoms may be due to a carbohydrate deficiency such as we see in protracted hyperthyroidism, or, on the other hand, they may be

caused by the presence of acetone bodies in the blood, which in excess will produce coma, as happens in diabetes mellitus.

Certain general diseases, such as tuberculosis, anæmia, arteriosclerosis and sensory defects, especially eye-strain or deafness, result in early fatigability. Chronic constipation in some people will produce sluggishness, headache, and a feeling of being under par, whereas in other people it apparently has no such effect. This is not the result of absorption from the bowel but of a rectal reflex, for the same effects can be produced by distending the bowel with absorbent cotton. Constipation can often be looked upon as a symptom of fatigue rather than as producing the fatigue itself. In most of these cases one finds a spastic type of colon, although in hyperthyroidism atonic constipation may be seen.

There are a few manifestations which I wish to stress specially, since too often they are viewed as a cause rather than a result of fatigue. It seems to be generally conceded that the early stage of essential hypertension is an arteriolar spasm. The tendency to spasm is possibly an inherited trait and is made worse by nervous or physical exhaustion. Chronic anxiety is a potent factor here also. One frequently sees essential hypertension in the high-strung nervous person who has developed chronic anxiety. We often find temperature elevation in states of nervous exhaustion, hyperthyroidism, anæmia, as well as in infectious diseases. Pyloro-spasm, ileocaecal spasm, and ano-spasm, as well as cardio-spasm, can be attributed to emotional disturbances, and are thus prone to occur in the fatigue state. Pyloro-spasm is often difficult to distinguish clinically from gallbladder disease. Moreover, ileocaecal spasm is frequently diagnosed chronic appendicitis. The rest necessitated by an operation may produce an apparent cure, usually attributed to the surgery *per se*. However, the result would be better if no operation were performed on the patient and he had taken his weeks of rest on a sounder pretext.

Although we have dealt at length with organic diseases producing fatigue, the etiological psychic disturbances are more commonly major problems. However, underlying endocrine or general systemic diseases predispose to a state of exhaustion. The treatment of the fatigue syndrome depends entirely upon the etiological factors concerned. We must obtain knowledge

of these from the complete history and physical examination, with due consideration of the changes which suggest endocrine imbalance. Often the patient may think the real cause is unimportant, and, unless questioned closely, will avoid the discussion of his psychic disturbances. The procedures of mental hygiene are of primary importance in treatment.

One of the major methods of therapy is to regulate the patient's life with regards to rest, activity, and eating. Irregularity in these respects is very common. Rest before midnight is valuable to stress, for the patient who avoids it will not likely get adequate sleep. On the other hand, we must not forget that bed rest does not necessarily give rest. One must remember that relaxation is not always obtained by inactivity, but may follow upon a sense of freedom to follow impulses of the moment. The Moslems, Quakers, and the Oxford Group do benefit their members by insisting on a time for meditation. Time to oneself to muse and think is beneficial. The doctor may wonder why his patient does not improve with bed rest, failing to realize that the patient is not necessarily resting because he is in bed.

The meals of these patients should be concentrated, of high vitamin content, and given at regular intervals. If there is much dyspepsia, it may be wise to give a little food frequently. Sedatives are of real value, and should be given in large doses, in order to ensure sleep. Insomnia may prove to be the result of continued sympathetic control during the night. We should choose our sedatives with due regard to

the action which we wish them to have. If the action should be prolonged, then use a sedative with a prolonged effect, and give repeated doses. We should not try to make the patient feel "dopey", however, as he is apt to resent this. Any endocrine disturbance should be treated with appropriate forms of biological products. Most of the endocrine products are so expensive that very few can be named that lie within the price range of the average purse. One may use extracts of anterior lobe pituitary, thyroid, and possibly a few others. Fortunately, the giving of one glandular product influences the action of other glands, stimulating or depressing them according to the product given.

Removal of foci of infections should not be looked upon as a cure-all. However, if we are dealing with definite foci of infections they should be removed so that the general health of the patient may be improved.

SUMMARY

There are many causes of chronic exhaustion. Each patient presenting the exhaustion syndrome must be studied from the viewpoint of psychopathology, endocrine imbalance, and general systemic disease. Pathological lesions having a bearing upon this syndrome may be found in more than one of these fields. Moreover, we must avoid thinking of the psychological and somatic factors as separated. Treatment must be considered not merely in terms of conditions but in terms of the entire individual in his social setting.

INDICATIONS FOR TONSILLECTOMY.—K. Vogel reports from the University Nose and Throat Department of the Charité Hospital in Berlin the attitude he and many of his colleagues adopt towards tonsillectomy for the relief of various local conditions, such as chronic tonsillitis, and of more general conditions, such as rheumatism. The figures Professor Vogel quotes are from Frankfurt and have already been published (*Med. Welt*, 1936, No. 49). They showed that tonsillectomy was followed by recovery in 72 per cent of the cases of articular rheumatism and by improvement in 15 per cent. The recovery rate was as high as 94 per cent in cases of acute articular rheumatism, whereas in chronic articular rheumatism only 52 per cent were cured and 30 per cent were improved after tonsillectomy. After quoting percentages of recoveries and improvements following ton-

sillectomies performed for other ailments, including rheumatic heart disease, glomerulonephritis, and gastrointestinal disturbances, etc., Professor Vogel concludes that relapsing sore throats and tonsillar abscesses are effectively prevented by tonsillectomy provided no diseased portion of tonsil is left behind. Less certain are the effects of tonsillectomy on chronic pharyngitis, laryngitis, and bronchitis originally due to infections of the tonsils, for in such cases the secondary foci established are apt to persist after the removal of the primary focus. To be really effective, tonsillectomy should, therefore, be performed as early as possible. By the time rheumatic polyarthritis, nephritis, endocarditis, etc., have become established the chances of their being cured by tonsillectomy are comparatively small.—*Dtsch. med. Wschr.*, Dec. 24, 1937, p. 1943. Abs. in *Brit. M. J.*

VESICO-INTESTINAL FISTULA

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A COMMUNICATION, direct or indirect, between any portion of the intestinal tract and the urinary bladder is uncommon but not extremely rare. According to Fowler¹ who reported a case in 1929, the number of cases recorded in the literature at that time did not exceed 500. Higgins,² in 1936, reviewing the literature and adding a number of new cases, found with his addition that the number of collected cases was then 548. In a comprehensive review of the literature we have found that not many more true cases of intestino-vesical fistula have been added to the records. The preponderance of the cases reported involve the large bowel and are of the sigmoido-vesical, colonic, cæcal-vesical and recto-vesical types, a lesser number being attachment of small bowel and bladder. We have had a case of this latter variety, an ileo-vesical fistula, and as this type is only infrequently seen we take interest in adding it to the literature.

Blanquinque, in 1870, reporting on this condition, first suggested a classification for vesico-intestinal fistulæ, although prior to this time some reference to this interesting condition had been made by writers of medical literature. In 1888 Harrison Cripps published his work "The passage of air and fæces from the urethra", in which he reviewed a collected series of 63 cases. This work is described by R. J. Willan,³ who also reported a series of cases that had been under his own supervision.

These fistulæ of course, are secondary to some causative factor, and in this respect the classification by R. Gordon Craig and Lee-Brown⁴ appears to be most adequate: (1) traumatic and (2) non-traumatic. The traumatic variety may originate from a wound or accident, or it may arise as a result of surgical procedures. The non-traumatic variety may be subdivided into: (a) inflammatory; (b) malignant; (c) tuberculous; (d) syphilitic; (e) actinomycotic; (f) echinococcal and (g) amœbic. The inflammatory may be due to: (1) abscess; (2) diverticulitis; (3) stone; (4) stricture; and (5) ulcer.

With reference to the symptomatology it may be said that this condition is accompanied by

definite and distressing features comprising the passage of gas *per urethram* (pneumaturia); (b) of fæces *per urethram*, and (c) of urine *per rectum*. These are generally coupled with frequency and cystitis due to the continuous introduction of fæces and organisms from the bowel. The fistula is often so constituted that only a one-way flow is obtained and little or no evidence of urine passing from the bowel is noted. This factor depends, of course, upon the underlying pathological condition, the organs involved, and the location of the openings between the connecting viscera. In many cases reported urine was present in the rectum in only very few instances. It is likewise true that there may be no fæces in the urine, especially in cases in which there is a minute orifice in the bladder, or in which œdema about the orifice is sufficient to close it partially and thus prevent fæcal material from entering the bladder. As soon as there is a channel between the bladder and the bowel, marked urinary symptoms, such as are associated with an acute cystitis, are evident. Frequency, urgency, extreme irritability of the bladder, with the passage of cloudy urine containing pus, blood, fæces and pneumaturia may be noticed by the patient. It is well to remember, however, that pneumaturia is not pathognomonic of a fistula between the bladder and bowel, as it may be present in bladder infections associated with glycosuria.

The diagnosis is usually established without difficulty. When air and fæcal matter escape with the passage of urine there can be no doubt that a communication exists somewhere between the bladder and some portion of the intestinal tract. It may, however, be difficult to determine the exact site at which the fistula opens into the bowel. It has been stated that if the fæcal material passed from the bladder is dark red in colour and contains particles of solid food it may be assumed that the connection is with the small bowel. If the opening is into the sigmoid or rectum it may be visualized by use of the proctoscope or sigmoidoscope. Roentgen examination with the use of opaque material introduced into the bowel or by cystograms may in some in-

stances produce satisfactory results. Cystoscopic examination will usually reveal the opening into the bladder and its location therein. The findings obtained by cystoscopy, however, vary with the length of time the fistulous communication has existed and with the acuteness of the process. In many cases the fistulous opening is quite easily observed. If, however, there be much generalized cystitis present or considerable œdema surrounding the orifice it may not be readily discernible. In most cases during the cystoscopy, irrespective of the bladder picture, faecal material is observed passing into it. Gas bubbles may also be seen escaping into the bladder, and often a hissing sound accompanying the passage of gas is heard.

An interesting feature noted in our cystoscopy, but not mentioned by other writers, was the absence of the usual air bubble. This would still be present if the fistulous orifice within the bladder was partly occluded to prevent air introduction passing on through the tract into the bowel, or, of course, if gas had passed from bowel to bladder during the filling of the latter with fluid preparatory for cystoscopic examination.

With reference to the treatment, it may be said that this is essentially surgical, and, if possible, the separation of the bladder from the bowel and closing the openings is the end to be desired. The simple fistula, in which neither bladder nor bowel is seriously diseased, may be resected successfully and the openings into bowel and bladder closed by suture. Surgical procedures, however, will vary in their extent, depending upon the primary pathological process causing the fistula. If the condition is the result of trauma, diverticulum, or non-tuberculous inflammation good results may be expected. If malignancy or an extensive tuberculous lesion is the cause surgical procedures may offer little hope of a cure, but if the condition is not far advanced, and resection of the diseased portion of bowel is also carried out, favourable results can be obtained. Palliative measures may be used as indicated by colostomy, cystotomy, or anastomosis of bowel so as to shunt the intestinal content from that portion involved, thus relieving the patient from an increasingly distressing condition.

The following is a brief outline of a case of vesico-intestinal fistula in which the communi-

cation was found to be between the ileum and urinary bladder.

CASE REPORT

G.W., male, aged 22 years, single, came under observation on May 11, 1935, with the following history.

Past history.—Appendectomy in 1929; chickenpox in adult life. Denied venereal disease. A Kahn test, six months previously, was negative. For the past two years he had had a condition diagnosed as "colitis". He would have periods of diarrhoea and occasional pain in epigastrium—this pain coming on at various periods and with no relation to food. It was somewhat sharp in character, never radiating, and when present usually of steady duration. At times he would have relief by making himself vomit. These periods of diarrhoea were often associated with considerable gas in the bowel.

Family history.—Negative.

Present complaints.—Pneumaturia; frequency and nocturia; urgency; burning on urination.

Onset and course.—About one week previously he was awakened in the morning with pain at the external meatus. This was described as the same type of pain experienced when a boil is developing. It was consistent and always felt at the external meatus. It would be relieved for a short time by passing urine, though during micturition he also felt a burning sensation through the urethra. With the onset of this pain he also had frequency of urination, having to void during the day about every one hour and at night two to three times. This condition was present for about three days, and then one morning he found that the pain had disappeared and there was no frequency, and he thought that he was better. Later, when he voided he noticed that some blood was passed (described as a blood clot) and this was followed by some purulent discharge. Following this he had no frequency and no pain until about two days later, when he noticed that he was commencing to pass air from the urethra. Shortly after this he also passed brown-coloured material which had a definite faecal odour. The pneumaturia increased in quantity and in frequency, and he also had frequent urination, having to void during the day about every one hour and at night two to three times. With the onset of this frequency he also had severe burning which was experienced along the urethra during the passing of the urine. The brown-coloured material that he was passing kept increasing, and he also found that with the desire for micturition he would have to pass urine at once. No more blood was observed.

General examination.—The patient did not appear acutely ill, though he was pale, showed evidence of loss in weight, and did not appear strong.

The physical examination (Dr. C. E. Brown, Vancouver, B.C.) was negative except for some tenderness and slight rigidity in the lower abdomen. X-ray of the chest was also negative and did not show any evidence of tuberculosis.

Proctoscopic examination.—(Dr. C. E. Brown) was negative; no ulcers nor fistulous opening were observed.

Barium enema.—Showed filling of entire colon without hesitation, and barium could be seen passing into the ileum. The markings throughout the large bowel appeared normal.

Cystoscopic examination.—(Earle R. Hall). The urine obtained was cloudy and had a somewhat faecal odour. The bladder showed some slight generalized cystitis. The usual air bubble was not present. The ureteral orifices were prominent and could be observed discharging clear urine. The trigone was normal. Just above the retro-trigonal recess and encroaching up the posterior wall was a definite circumscribed area of bullous œdema which partially surrounded an aperture in the bladder mucosa. This opening was dark and showed efflux of material dark in colour and some

greyish and mucoid in appearance. With this efflux a slight hissing sound was noticed. Catheters passed up each ureter without difficulty or obstruction. The urines obtained from each kidney were clear. Pyelograms were made.

Urine examination.—Catheter specimens from each kidney were negative; also negative for tuberculosis. The bladder specimen was cloudy, and had a faecal odour; albumin three plus, sugar 0. Microscopically, showed white blood cells three plus, red blood cells two plus, and many bacteria. The bladder specimen was negative for tuberculosis.

Pyelography did not show any abnormality of the kidneys, both being within normal limits.

A diagnosis of entero-vesical fistula was made and operation advised. This was done in two stages.

First operation.—May 25, 1935 (Earle R. Hall).—A suprapubic mid-line incision was made. A large mass was encountered which was found to involve the urinary bladder. Multiple adhesions were present and, after a careful dissection, the mass was found to be small bowel, and a direct communication between this and the bladder was exposed. The fistulous tract was resected and the openings in the viscera closed. It was evident that the causative factor was a diseased portion of ileum which would require resection. The condition of the patient was not of the best, and it was decided to close up and do a second operation. The post-operative course was uneventful and he had relief from his previous urinary distress, micturition returning to normal.

Second operation.—August 14, 1935 (Norman D. Hall).—Laparotomy by a right rectus incision over the palpable mass was performed. On opening the peritoneum a definite tumour mass was encountered involving the distal portion of the ileum. This area was hard and showed numerous adhesions. The bowel distal to the mass was collapsed and appeared empty, while the proximal portion was somewhat ballooned out. The wall of the involved portion of gut was very thick, and it appeared as if the lumen were almost obliterated. A typical lateral anastomosis was carried out, some eleven inches of the distal ileum being removed, this containing the tumour mass in the mid portion with about one and one-half inches of normal-looking bowel at each extremity. Many adhesions were encountered, a few being attached to the bladder, but at this time no definite close adhesion or connection of small bowel to the bladder could be made out. The usual wound closure was made and an enterostomy tube inserted to protect pressure on the suture line of the anastomosis.

The post-operative course was not very stormy, and the patient's progress was quite satisfactory. His wound healed up quite well, except for a small sinus opening at the upper angle from which the enterostomy tube had entered the abdomen. He was discharged from the hospital.

Pathological report.—(Dr. H. H. Pitts, Vancouver.) "Specimen consists of a piece of small intestine about eleven inches long, most of which is thick and firm. Section shows about one and one-half inches of apparently normal intestine at each extremity. The inter-

vening portion consists of very thick granulomatous-appearing tissue projecting into and nearly obliterating the lumen. This tissue is rather suggestive of neoplastic type.

"Microscopic.—Numerous sections were taken at different levels through the specimen of tissue, and they show a definite granulomatous process characterized by well defined tubercle-formation, consisting of epithelioid and giant cells, with occasional small areas of caseation, diffuse lymphocytic and plasma-cell infiltration, and fibrosis. This is seen chiefly in the mucosal and sub-mucosal layers, although the former is quite extensively desquamated, and throughout the remaining coats of the gut extensive fibrosis and this similar granulomatous infiltration is noted. **Diagnosis.**—Tuberculous enteritis." The final diagnosis was vesico-intestinal (ileum) fistula, caused by tuberculosis of the ileum.

Progress report and summary.—At the present time, which is about two years following his discharge from the hospital, the patient has made fairly good progress in his general condition, and his present weight is greater than any time during the past five years. He feels well generally and has no urinary distress. His wound is entirely healed, except for a very small sinus at the upper angle.

The interesting features of this case are that this type of fistula is one of the rarest encountered, being a communication from the small intestine (ileum) into the urinary bladder, the cause of this being a tuberculous infection of this portion of the small bowel. It is also of note that no other system showed any evidence of tuberculosis, and the man had never had any symptoms suggesting involvement of the chest, which was also found to be negative upon x-ray examination. As his general condition has been steadily improving a third operation has been under consideration to attempt closure of the existing sinus, which would then give him a completely satisfactory result from his previous affliction.

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CEREBRAL ARTERIOGRAPHY.—H. Davies describes the technique of cerebral arteriography as carried out at the National Hospital, Queen Square, London, and gives a summary of the different arteriographic appearances in the normal brain and in cases of cerebral tumour or aneurysm. He does not believe that the doses of thorotrast used in cerebral arteriography have a delayed deleterious effect on the body. For the diagnosis of tumours of the temporal lobe and cerebellum, which

derive their main blood supply from the basilar trunk, the author's advice is to inject this vessel through the subclavian artery; but as the thorotrast is being injected against the blood stream that part of the artery which is distal to the point of injection is compressed, and this makes the thorotrast flow up the vertebral artery and the basilar trunk. With this technique the branches which supply the cerebellum can be clearly seen.—*Brit. J. Radiol.*, Dec., 1937, p. 871. Abs. in *Brit. M. J.*

VOLVULUS OF THE CÆCUM: REPORT OF TWO CASES

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VOLVULUS of the cæcum has been defined as a condition in which there is torsion limited to the cæcum, ascending colon, and the adjacent portion of the small intestine (Gatellier, Moutier and Porcher¹).

The condition may develop more or less suddenly and constitute a definite surgical emergency. This type has been well known for many decades; isolated cases are published every year. Diagnosis is proved by the findings at operation for an unexplained acute intestinal obstruction, or by an autopsy. In contra-distinction to this variety, presenting as it does a dramatic clinical picture calling insistently for early surgical intervention, and showing unmistakable designs upon the life of its host, there is a less obvious type towards which notice has been directed in the present century by Corner and Sargent,² Sweet,³ and others. This variety has been recognized in certain cases only and as a result of its terminating in the unequivocal acute type. It has proved possible to argue back in the history and interpret in a new light certain abdominal symptoms to which these individuals as a group were prone. A similar symptom-complex is frequently met by every practising medical man, and an off-hand diagnosis of "chronic appendicitis" is usually made. After seeking to relate the syndrome in question to recurrent and transient attacks of cæcal volvulus, Corner and Sargent sum up in the following words:

"If we are right, something will have been done to relieve the vermiform appendix of a little of its evil reputation, and perhaps to explain some of those not uncommon cases of recurrent attacks of abdominal pain with fullness and tenderness in the right iliac fossa, constipation, and vomiting, but unaccompanied by fever, which may be brought on by exertion or some other slight cause, and which pass off in the course of a few hours."

It is intended in this paper, first, to present a concise account of the principal features of volvulus of the cæcum, contrasting as far as possible the two distinct types outlined above. Secondly, it is proposed to report two recent, successful cases. Case 1, a personal case, illus-

trates many of the features of the acute type of cæcal volvulus; Case 2, under the care of Dr. M. G. Peever, of London, is an excellent example of the recurrent variety. It is hoped that consideration of this latter case may shed some light on the way in which physiological disturbances causing symptoms referable to the right lower abdomen may be traced down to a pathological basis other than that generally and carelessly accepted.

Incidence.—A survey of the literature shows that some three to five cases of volvulus of the cæcum are reported each year; practically all of these are in foreign journals. The comparative rarity on this continent may be judged from the fact that Sweet, when reporting a personal case, was able to locate records of only 6 cases in the Massachusetts General Hospital in a period of 57 years; this means approximately one example of the acute and recognized variety each ten years on the average. It has not been possible to find any record of a single case in London (Ont.), either among the records of the Victoria Hospital or from a personal canvass of a number of surgeons and pathologists. An extensive, although not truly exhaustive search of the literature, has failed to discover a record of any case in Canada. (One similar but not identical case was published in 1913 by the late Dr. Olmstead, of Hamilton;⁴ in this one the transverse colon was also involved in the torsion, bringing it outside the limits of our definition, although the embryological background must have been like in kind but greater only in degree).

In North America volvulus of the cæcum is much the least common form of volvulus; in certain countries of northern Europe, notably Finland and Russia, its incidence is practically as great as that of volvulus of the small bowel, and much greater than that of the sigmoid colon (comparative figures are quoted by Sweet). It occurs at all ages and in both sexes, but about 70 per cent of cases are in males; both cases reported herewith were males. These remarks

apply to the acute type of case. The true incidence of the milder, recurrent variety is quite unknown.

Etiology. (a) *Developmental anomalies.*—The essential feature underlying every case of grossly abnormal rotation of the cæcum is a congenital lack of adequate fixation of the cæco-colon. If possessed of a mesentery this portion of intestine is free to move about, or to be moved, in various ways, making possible a variety of torsions and displacements as a result of the influence of certain forces. Once displaced, the affected part, by its property of inertia, may be pictured as tending to retain the abnormal attitude. A number of anomalies of the colon and rectum are recognized as the primary factors underlying several conditions of the abdomen requiring surgical intervention. Among the five chief members distinguished by Lynch⁵ a prominent place is accorded to non-fixation of the cæco-colon. In a classical article, Dott⁶ has clearly presented the various derangements of intestinal rotation that may occur and the pathological consequences which may follow.

The explanation of non-fixation of the cæco-colon appears to be comparatively straightforward. Following completion of the second stage of intestinal rotation, in the tenth and eleventh weeks of intra-uterine life, the elongated mid-gut is suspended from the dorsal wall by a narrow pedicle about the origin of the superior mesenteric artery. During the third stage, a process of fusion takes place between the apposed serous surfaces of the mesentery and the posterior parietal peritoneum. This process normally commences with the duodenum and then extends to involve fixation of the left and finally the right colon. As a result of it the linear "root of the mesentery" comes into existence. The cæcal region is the last to become fixed, inasmuch as the cæcum only gradually acquires its definitive position; usually the adhesive process is completed by the end of the fifth month.

The developmental changes taking place in the region of the cæcum lend themselves to a number of abnormalities. The normal sequence of events may be either incomplete, or, less commonly, excessive in degree. It has been variously estimated that from 10 to 19 per cent of cadavers show a degree of cæcum mobile sufficient to permit volvulus to develop. Sweet has emphasized the presence in these cases of a fixed

point about which rotation occurs; this is usually found in relation to some part of the ascending colon. Undue tethering of the terminal ileum may provide a second point of fixation, explaining certain differences regarding types of rotation, as pointed out by Corner and Sargent. There is considerable individual variation in the exact site and extent of these zones of relatively excessive fixation. It may be accepted that developmental anomalies underlie the vast majority of cases of volvulus occurring in any part of the intestinal tract. In the first few days of life it is not unusual to find a very extensive volvulus, resulting from deficient fixation. Later in life torsion may occur in any abnormally mobile segment. In isolated cases anomalous folds, adhesions and vessels have been described as prominent agents.

(b) *Acquired factors.*—Corner and Sargent stressed the importance of acquired lateral pouches of the cæcum. These are pictured as arising from the distending influence of gas produced by bacterial fermentation processes where stasis is present for some time. Habitual constipation may well be of note. The type of diet deserves mention, for it is possible that the high incidence of cæcal volvulus in northern Europe may be related to the coarse vegetable diets in vogue among the peasants of those parts. Overloading of the cæcum does seem important, and large meals appeared to have a place in connection with the attacks in Case 2. Adhesions following an inflammatory condition may play a minor rôle occasionally.

(c) *Precipitating factors.*—Given these various conditions which allow cæcal rotation to take place, one must still account for the forces actually causing the rotation in one of the accepted manners (three types of rotation are described, according as the twist occurs about a transverse axis, an oblique axis, or the longitudinal axis). The last constitutes a true axial rotation of the sort dealt with by Fagge⁷ in his Bradshaw lecture, 1928. Combined varieties also occur. The cæcum is found most frequently twisted in the oblique manner, being directed up towards the spleen. The exact mechanism of the torsion is no more definitely established than many other aspects of this rather vexed question. It is possible that different agents cooperate in regard to the different types of twisting. Several possibilities suggest themselves as likely factors.

As intrinsic causes one may cite especially hyperactive peristaltic movements, such as may accompany diarrhoea or the use of drastic purgatives, and an overloaded caecum. The pressure of adjacent organs and structures may have some influence; a definite relation to a large pregnant uterus in rare cases has appeared to be more than coincidental. The chief agent is unquestionably the effect of muscular contraction on the part of the abdominal wall; in most examples of the recurrent type it has been found that attacks were particularly prone to follow sudden strains or twists. Occasionally, violent diaphragmatic movements have proved responsible. Passive movements would seem to be unimportant.

In the vast majority of cases it is likely that two or more inciting causes be operating together, a view propounded by Fagge *a propos* of axial torsion of abdominal viscera. The often powerful "mass peristalsis" of the lower small bowel and colon, constituting the motor phenomena of the gastro-ileal and gastro-colic reflexes, acting in conjunction with the active contractions of the abdominal musculature, may easily be pictured as causing distortion, irregular movements, and torsions in such structures as are free to respond to these forces.

Clinical manifestations.—The clinical pictures are in no way distinctive. The acute type of caecal volvulus presents the features of an acute intestinal obstruction, the degree of acuteness varying from hours to days (explaining the recognition of acute, subacute and chronic cases by Corner and Sargent). The exact constellation of symptoms and signs in a given case will be influenced by many factors, including the variety of torsion, the position of the caecum, the time factor, and the relative degrees and durations of obstruction and strangulation. Gaseous distension of the caecum usually gives an early and typical tender, tympanitic swelling, usually in the right lower abdomen. The evidences of such an acute intestinal obstruction of a given duration, and involving strangulation of a medium-length loop of bowel, are too familiar to require detailing.

The characteristic features of the recurrent type have been mentioned already. Typical attacks occur probably a few times each year. The onset may be known to follow some pre-

cipitating circumstance. The duration of attacks varies at different times and in different persons from minutes to hours or even days. There may be vague abdominal discomfort and perhaps fullness over the right iliac fossa; or there may be actual pain of either a colicky, generalized sort, or more or less restricted to the right lower abdomen. Constipation may be absolute, but this is observed only in the more prolonged attacks. Spontaneous relief is eventually obtained, it may be along with the passage of a foul-smelling, bulky, liquid stool. Alteration of the pulse or temperature is unusual. Between bouts the general health is characteristically good, but chronic constipation is common.

Course and prognosis.—The effect of the obstruction of both the lumen of the bowel and the blood supply of the twisted segment in the acute type is to lead to increasing abdominal distension and tympanites locally, and progressive general decline of the patient. The rate varies, but the deterioration is inexorable, and the end must be dissolution unless there is surgical aid. The outlook with operative treatment depends on the general state of the patient and the local findings within the abdomen. Early operation, a minimum of interference required, an experienced surgeon, and effective after-treatment, are factors likely to influence the outlook in a favourable manner. Conversely, long delay, necessitating resection of damaged gut, is specially likely to yield a high mortality, while the opposite to any of the above will be prejudicial to the best interests of the patient. So far as I have been able to discover, recurrence has not been noted after successful operative treatment.

In the recurrent type the course is most uncertain; attacks are irregularly spaced as well as variable in severity. Sooner or later these patients tend to develop an attack of sufficient gravity to place them in the acute group as surgical emergencies. In as much as it is quite impossible at present to state the true incidence of this variety of caecal volvulus any estimate of the proportion of cases that develop the dangerous acute condition must be a matter of pure conjecture. It may be accepted that a very definite risk of this change taking place does exist. No doubt the hazards attending a timely and expeditious interval operation in any

patient with a history of repeated, severe attacks, should be less than those incurred by adopting a policy of procrastination.

Diagnosis.—The diagnosis of acute cæcal volvulus is very seldom made correctly apart from the findings at operation or autopsy. It may be suspected where the characteristic swelling in the right lower abdomen accompanies the clinical picture of a fairly low acute intestinal obstruction. Otherwise the features are simply those seen in corresponding examples of acute intestinal obstruction due to other causes. Rarely, a history of recurring attacks of abdominal pain may offer a clue.

Regarding the recurrent and partial variety the diagnosis probably deserves serious thought much more frequently than is the case. Mild attacks offer no distinctive signs or symptoms as compared with many more common causes of vague abdominal discomfort. Irregular spacing of such attacks over several years is suggestive. Characteristically, the onset of each attack may be related to some constant factors; the nature of the attack favours a mechanical rather than an inflammatory intra-abdominal lesion, and the duration is brief. The individual features previously listed should be sought. Any hope of accurate diagnosis in the early stages demands a most thorough analysis of (a) the history of repeated attacks, and (b) the special characters of the first and each subsequent attack. Careful consideration of every possible case, with special relation to the precipitating causes, sequence of events, duration and termination of all attacks may be expected in time to yield a certain number of correct positive diagnoses before operation. During the attack a barium x-ray examination may be of value.

It is impossible merely to mention all of the differential diagnoses. As a rule true appendicular inflammation can be excluded by the transitory nature of the attacks (inflammation in a deeply-situated viscus will usually last a day or two at least, and symptoms arising from such a condition are likely to have a longer duration too), and by the entire absence of fever. Symptoms related to functional abnormalities of the ileo-cæcal valve are likely to occur frequently and be short-lived. Discomfort arising in a constantly overloaded cæcum, as where stasis accompanies a chronically costive state, will occur frequently and be unlikely to initiate

severe attacks. Every detail must be assessed in an attempt to pick up instances of partial and recurrent volvulus of the cæcum.

Treatment.—The acute variety calls for urgent operation. Once the true nature and degree of the torsion have been estimated, the aim is to restore the parts to their *status quo ante*, relieve the obstruction and the vascular interference, deal with hopelessly damaged gut as necessary, perhaps provide drainage of the bowel, and, possibly, fix the mobile cæcum. The choice of operative procedure is dictated by the condition of the patient, the state of the strangulated loop of intestine and of the obstructed bowel above this level, and by the operative experience and facilities of the surgeon. Many cases require a preliminary deflation of the ballooned cæcum before detorsion can be accomplished. Advanced cases merit cæcostomy, a procedure also widely recommended as a means of fixing the cæcum and ensuring against a later recurrence. A gangrenous cæcum may demand resection, but this should never be completed at one stage in an ill patient with such a condition; temporary drainage of the open ends after rapid excision, followed by a later anastomosis (various methods may suit different cases), will offer a far greater chance of success.

Every case calls for all the supportive and general measures applicable to patients suffering from the effects of acute intestinal obstruction; shock, dehydration, a disturbed chemical equilibrium of the blood, and possibly diffuse peritonitis, must all be combated. All procedures chosen should be inspired with the purpose that life be saved, good health be regained and retained, and recovery be accelerated safely where possible. The aims must follow the order listed.

The recurrent type of case also calls for operation. Urgency need not be a factor. Non-fixation of the cæco-colon must be remedied, perhaps best by suturing to the anterior abdominal wall. Cæco-plication, following appendectomy, may have value as an adjuvant measure, for in most of these the cæcum is of the large, saccular variety.

CASE 1

F.P., male, aged 61, farmer, of English and "Pennsylvania Dutch" extraction.

Past history.—Not significant apart from symptoms of an active chronic peptic ulcer for many years, with severe hæmatemesis and melæna on one occasion 14 years ago (all symptoms absent for last 6 years), and one attack of hæmaturia, with "gravel", and pain of right

renal character and distribution, 4 years ago. No other illnesses of note and no other memorable attacks of abdominal pain.

Present illness.—Gradual onset of lower abdominal pain about 5 p.m. on August 7, 1937. He had just completed an afternoon of riding on the disc harrows over a particularly rough piece of farmland. The pain was confined to the middle region of the hypogastrium and was apparently steady at the commencement. Soon it acquired a "crampy" character, with bouts which were brought on by active movements and relieved by lying on the right side with that thigh flexed. Vomiting occurred on three occasions, first about midnight; the vomitus was not unusual. He was unable to sleep. The bowels did not move, but he thought that some gas was passed during the night.

Physical findings.—I saw him some 18 hours after the onset. He was lying curled up in bed on his right side, and resisted moving or being disturbed. Temperature, pulse and respirations were not at all abnormal. The abdomen moved little with respiration, especially in the right lower quadrant; a well-defined, tender, resonant swelling underlying the right lower rectus muscle was made out on palpation. This felt about the size of an orange, but it was somewhat obscured by some spasm of the overlying muscle. The leukocyte count was 13,000, with 66 per cent neutrophils. The urine contained traces of both albumin and sugar. The other clinical and laboratory observations were normal.

The pre-operative diagnosis was acute appendicitis; the mass was thought to be inflammatory, probably oedematous omentum and caecal wall, in spite of the shortness of the history, etc.

Operation.—The abdomen was explored through a right lower para-rectal incision; all intercostal nerves were zealously preserved. The caecum and adjacent portions of small and large bowel were involved in a complete 360° twist in a clockwise direction; the ileum entered in approximately the normal situation, but it reached this site by winding tightly about the region of the torsion. The caecum was distended to a size exceeding a fetal head; its wall was markedly engorged, but it was perfectly viable, and the circulation was readily restored. The appendix appeared anteriorly; it was similarly congested. Detorsion was performed, and the gas gurgled freely on along the lumen of the colon. It was now seen that the mesentery of the terminal ileum continued on as a continuous sheet to include a mobile caecum and some one and one-half inches of the ascending colon. The colon was relatively firmly attached at the point of cessation of this mesenteric connection. In as much as the caecum was grossly distended it was decided to do a plication, suturing the anterior and lateral tæniæ together, thus causing marked diminution in the size of the viscus. No fixation was done. The appendix was removed; it contained numerous thread-worms. Recovery was uneventful. The patient was discharged free from all symptoms on the 18th day.

CASE 2

J.C., male, aged 25, farmer, of Irish stock.

Past history.—A definite history of recurring attacks of abdominal discomfort or pain covering a period of 18 years. It was not possible to establish all the details concerning the first attack; apparently this occurred when he was 7 years of age; it was believed to have been severe. He was kept in hospital for about 6 days, under observation as a case of acute appendicitis. Operation was avoided because of a coincident whooping-cough. Since that time he had been subject to up to three attacks each year. The free intervals fluctuated between two weeks and one year.

The attacks were variable in intensity, and lasted from ten minutes to two hours. The onset was gradual and often related to eating an unusually large meal; there was no constant time relation. Sometimes vague discomfort was felt; at other times "cramps like gas

pains" would double him up. Vomiting accompanied four of the most violent attacks. Recovery would take place spontaneously and rapidly. He was unaware of any circumstance which appeared to influence these attacks in any precise manner. He suffered from constipation rather spasmodically, but not in relation to the attacks at least not noticeably. The last attack occurred one year previously.

Present illness.—After feeling well all day, August 9, 1937, he gradually developed generalized crampy abdominal pain, starting two hours after his evening meal. The characters at the onset were identical with those of his former attacks. This pain persisted with very little change during the subsequent three days. It seemed to become worse in the lower abdomen, and when he attempted to lie on the left side. Vomiting occurred infrequently. He stated that there was no passage of either faeces or flatus per rectum.

He was admitted to hospital on the third day, when it was recorded that there was only moderate abdominal distension of a diffuse type, with some corresponding tenderness which was not sharply localized. He was unable to void. A catheter specimen of urine showed albumin 3 plus, with occasional red blood cells and pus cells. Hot applications to the abdomen gave some relief, while repeated enemata obtained a little gas but no faecal matter. It was felt that his generally poor condition, along with the small amount of albuminous urine, indicated a late stage of renal failure, and he was treated expectantly for four days. The pain continued with slight oscillations, and his general state varied little until the fourth day. There was some dysuria, with occasional dribbling of a very few ounces of urine, and almost none to be found on catheterization. The leukocyte count ranged about 14,000. The temperature, pulse and respiration remained about normal.

On the 16th, one week after the onset, his condition suddenly began to deteriorate. He felt very poorly. The distension increased steadily. The pulse rose to over 120, temperature to 101°, and respirations to 26. Now enemata elicited no response whatever. The urine was re-examined and found to be albumin-free. It was realized at once that an acute abdominal condition was present.

Operation.—The peritoneal cavity was found to contain a moderate excess of sero-sanguinous fluid. The caecum was described as "enormously dilated": it was rotated in a clockwise direction a little over 180°, causing the appendix to present anteriorly. The caecum filled the entire pelvic cavity as well as most of the abdominal space. It was emptied of several "dishes" of liquid faeces by means of a trocar. Detorsion was performed, followed by caecostomy. The caecum was judged to be viable. As with the other case, a definite extension of the mesentery to the caecum, and most of the transverse colon in this instance, was noted.

Following a stormy period this man went straight ahead. At the time this is written, nearly a month after the operation, he is almost ready to get up out of bed, and his wound is practically dry.

SUMMARY AND CONCLUSIONS

1. Two distinct types of caecal volvulus are described, and a recent, successful case illustrative of each is reported.
2. The two types are considered in some detail regarding etiology, clinical features, prognosis, diagnosis, treatment, and other aspects.
3. The essential factor underlying practically all cases is a developmental anomaly in the form

of non-fixation of the cæco-colon. The relevant embryological aspects are discussed. Certain acquired factors are mentioned, and an attempt is made to elucidate the various forces which actually produce the torsion of the mobile cæcum as well as those which permit its occurrence.

4. The acute type appears essentially as an obscure and uncommon form of acute intestinal obstruction. Correct diagnosis is very unlikely, apart from the operative or autopsy findings. The recurrent variety occurs in the form of repeated attacks of abdominal symptoms which vary considerably in different individuals and at different times. It would seem that the diagnosis has never been established before a case has terminated in an attack of the acute type, when retrospect permits a more intelligent analysis of the history.

5. It is pointed out that it is both possible and probable that many cases of recurrent symptoms referred to the right lower quadrant of the abdomen, and usually carelessly classified as "chronic appendicitis", are really examples of temporary or partial volvulus of the cæcum. Certain points of value in differentiating such mechanical conditions from those with an inflammatory basis are mentioned. These cases merit a searching history, with special consideration of every aspect of their attacks in order

to seek a true diagnosis. Where operation is performed, and such findings as a normal appendix with a saccular non-fixed cæcum leave room for doubt, the advisability of diminishing and/or fixing the cæcum deserves thought.

6. Treatment must be operative in either type. It must be early in the acute variety and adjusted to the needs and recuperative powers of the particular patient. The after-care is also important.

I wish to gratefully acknowledge the kind permission of Dr. M. G. Peever to give the details of Case 2, which was under his care.

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ACARIASIS OF THE URINARY TRACT CAUSED BY HISTOGASTER

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THE ordinary textbook description of cystitis rarely mentions mites as a cause. In the more specialized books on urology mention is made of parasites in the bladder but little space is given to any parasite other than *Bilharzia*.

Finding numerous mites in the urine of the case I am here reporting led me to search the literature of the last few years without success for case reports of a similar nature.

Chandler,¹ however, states in his textbook, "There are records of mites which are not normally parasitic at all, living and multiplying in the human bladder . . . Cases of parasitism of the intestine and urinary tract with mites of the family of Tyroglyphidae and Tarsonemidae are not infrequent."

The case I am reporting is as follows.

Miss C., aged 11, was brought to the office complaining of frequent desire to pass water. This had been present for the last three weeks. At times this desire would be every few minutes and the urge to urinate would still be present after the act. At other times she would be free for half a day or more. Lately she had had fewer periods of freedom and two miserable days forced her to consult the doctor.

Examination revealed a normally developed girl with no constitutional disturbance. In fact, she looked extremely well as she had just come back from a winter in Florida. The throat, chest and abdomen were negative. The urethral opening showed no signs of inflammation. A sample of urine was collected and she was given a simple potassium citrate mixture and told to return for further investigation the following day. Urinalysis showed a neutral urine with no sugar or albumin. Microscopic examination of a centrifuged sample showed epithelial cells in abundance and many pus cells. Several little mites about the size of scabies were seen swimming around in the urine. The

drawings made of these are reproduced here. On the following day a very careful examination was made of the external parts for any trace of parasites, but none was found. A catheter specimen was taken and the living parasites were again easily demonstrated in the urine. A diagnosis of cystitis due to these parasites was made.

The girl was treated by thorough irrigation with boracic solution and one ounce of 5 per cent aqueous solution of mercurochrome was left in the bladder.

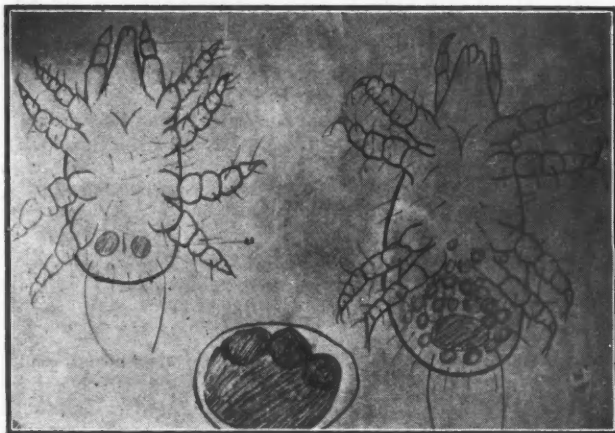


Fig. 1.—Male and female mite and mature ovum. Two round anal suckers are seen near the anus in the male. Many immature ova were present in abdomen of female.

After the first treatment there was almost complete cessation of symptoms. She was given three other treatments with one-day interval, and then kept under observation. No more parasites or ova were ever found in the urine and the patient has been completely cured.

With the aid of some friends in the Department of Biology the mite was classified as follows:

Phylum.—Arthropoda (jointed limbs).

Group.—Acarina (4 pairs of legs, 3 parts of body coalesced).

Family.—Tyroglyphidae (no eyes, no trachea, 5 segments in legs, pedipalpi 3 segments).

Genus.—Histogaster (males have suctorial pores in abdomen).

Just how the mites got into the urinary bladder is difficult to understand. As the Tyroglyphidae are found in cheese and all cereals their presence in the intestinal tract is easily explained. Patton² suggests that the mites burrow from the rectum to the bladder. This does not seem to me a reasonable explanation in the case of the female where the rectum is separated from the bladder by the uterus and broad ligament. It is much more reasonable to believe that the mites have a tendency to wander into cavities, and that they migrated from the anus to bladder and there reproduced.

My first impression on seeing this mite was that the cystitis was caused by bites or wounds made by the parasite, similar to the burrows of *Sarcoptes scabiei*. Chandler suggests that the irritation is caused by a specific poison secreted by the mite rather than by any wound it produces. The ease with which this case was cleared up, strongly supports the latter view.

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MANDELIC ACID IN THE TREATMENT OF PYURIA*

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A SURVEY of the literature on the treatment of pyelitis or pyuria during the past twenty years reveals that the methods employed were usually conservative and the drugs used were numerous. The drug therapy has consisted in the administration of alkalies, acids, acids alternating with alkalies, dyes, such as gentian violet and pyridine, urinary antiseptics, high vitamin diet, autogenous vaccines, and bacteriophages. Surgical procedures have consisted of pelvic

lavage and ureteral drainage. Clinically, it is recognized that the patient is cured when there are no fever or urinary symptoms, and the urine has become pus-free though not always bacteria-free. With the use of any of the above therapeutic measures it has been possible to cure acute pyuria, but in treating persistent or chronic pyuria, that is, pyuria associated with obstruction in the urinary tract, the results have been indifferent.

It was recognized by Pasteur as early as 1879 that the life of the microbe was influenced by the acidity of the culture media, and in 1881 Koch used alkalies and acids as germicides. In

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1917, Shohl and Janney¹ demonstrated the hydrogen-ion concentration or reaction of the urine which would inhibit the growth of organisms. They found, first, that the average reaction of the urine of a person on a mixed diet varied from a slightly acid reaction of pH 6.0 to a neutral one of pH 7.0, and, secondly, that organisms of the colon group and staphylococci were inhibited in growth when the acidity of the urine was as acid as a pH of 4.6 to 5.0, or as alkaline as a pH of 9.2 to 9.6. These *in vitro* experiments led to the belief that growth of bacteria would be inhibited when large doses of alkalies such as potassium citrate and sodium bicarbonate were administered, or when large doses of acid-forming salts such as ammonium chloride were administered to produce an acid urine. However, Helmholtz,² giving large doses of alkali by the mouth, was unable to produce an urinary alkalinity greater than pH 8.6, which was less alkaline than the pH at which the colon bacillus grows well. The cures obtained in acute pyuria have been due to self-limitation of the disease, and in addition some of the drugs as potassium citrate and ammonium chloride act as diuretics.

Urinary antiseptics have been used since 1895, when Nicolaier³ gave hexamethylenamin. The urine was rendered acid by prescribing either ammonium chloride or acid sodium phosphate, and in this acid urine formaldehyde is liberated. The liberation of formaldehyde took place in the bladder, as Hinman⁴ found in 23 specimens of urine obtained directly from the kidney pelvis by ureteral catheter that 18 urines had no formaldehyde, while 5 showed mere traces that were devoid of any antiseptic value. He also examined the formaldehyde content of 318 specimens of urine in patients receiving 15 grains of methanimine t.i.d. and in 64 per cent the concentration of formaldehyde present had no antiseptic value. The use of urinary antiseptics requires restriction of the water intake to obtain a sufficient concentration of formaldehyde. The results of treating with urinary antiseptics have been variable, the failure being in part due to urine that has not been acid enough and to an inadequate concentration of formaldehyde.

In 1931, Clark and Helmholtz⁵ showed that the urine from a patient on a ketogenic diet was bactericidal when the acidity of the urine was

more acid than pH 5.6. In 1933, Fuller⁶ demonstrated experimentally that the principal factor of the ketogenic diet inhibiting the growth of bacteria in the acid urine of a patient on a ketogenic diet was due to alpha-beta-hydroxy-butyric acid. This ketone body was bactericidal in a concentration of 1.5 per cent and inactive when the urinary reaction was more alkaline than a pH of 5.6. In hope of simplifying the treatment alpha-beta-hydroxy-butyric acid was given by mouth. This was ineffective, due to its oxidation in the body to water and carbon dioxide.

Finally, Rosenheim,⁷ in 1935, after experimenting with several organic acids similar to the ketone acids, found that mandelic acid when administered orally was excreted unaltered by the kidneys, and in sufficient concentration for bactericidal action, providing the urine was acid enough. Helmholtz and Osterberg⁸ later found that sodium mandelate, *i.e.*, the sodium salt of mandelic acid, was bactericidal when mandelic acid was excreted in a concentration of 0.25 to 1 per cent in the urine and the urinary acidity was more acid than a pH of 5.8. To produce this acidity, ammonium chloride was administered with the sodium mandelate.

In the treatment of a series of cases of infection of the urinary tract at the Hospital for Sick Children, Toronto, sodium mandelate with ammonium chloride was first used, but later ammonium mandelate was given. The dosage of sodium mandelate prescribed varied with the age of the child and was as follows:

Age	Sodium mandelate	Ammonium chloride
Up to 2 years	10-15 grs. t.i.d.	10-15 grs. t.i.d.
2 to 5 years	20-30 grs. t.i.d.	20 grs. t.i.d.
5 to 12 years	30-40 grs. t.i.d.	20 grs. t.i.d.

Ordinarily, with this dosage of ammonium chloride the acidity of the urine was pH 5.4 to 5.6 within a few days. If not, the dosage of ammonium chloride should be increased gradually to 100-120 grs. daily, or till the required acidity is obtained.

Ammonium mandelate, *i.e.*, the ammonium salt of mandelic acid, was later introduced to eliminate the giving of ammonium chloride. The dosage is as follows:

Age	Ammonium mandelate
Up to 2 years	drs. $\frac{1}{2}$ - drs. 1. t.i.d.
2 to 6 years	drs. 1 - drs. $1\frac{1}{2}$, t.i.d.
6 years and up	drs. 2, t.i.d.

With this salt it is important to determine daily the acidity of the urine, and if the required acidity is not obtained ammonium chloride should be given in addition. The maintenance of a more acid urine than that with pH 5.6 is one of the most important requisites of the treatment, because, as has been mentioned before, if the urine is more alkaline than pH 5.8, the drug will not produce a sterile urine. The acidity of the urine is easily determined by adding 5 drops of methyl red to 5 c.c. of urine. At pH 5.3 the urine turns a bright red, which is the required acidity, while in a more alkaline urine the methyl red turns the urine a bright yellow or orange colour. Indicator papers may now be obtained to determine the correct acidity of the urine. In addition to the drug treatment the diet of the child should be supervised, and during the period of treatment no citrus fruits allowed, or alkaline drugs, as they produce an alkaline urine. In some cases where difficulty is encountered in rendering the urine acid, as in infants on a milk formula, it has been found that acidifying the milk feeding with 1 teaspoonful of N/10 HCl to 10 ounces of milk mixture has aided in reducing the urine to the required acidity. If there is difficulty in older children during the period of acidification, more foods which give an acid ash, such as meat, fish, eggs, cereal, bread, prunes, plums and rhubarb might be given, while base-forming foods such as vegetables, milk, and cheese might be restricted. Sugars, starches, syrup, tapioca and butter are neutral. It has been advocated in the treatment of adults that fluids should be restricted to 1,200 c.c. daily. In this series there was no fluid restriction.

THE RESULTS OF SODIUM MANDELATE THERAPY

During the past 17 months 52 cases of infection of the urinary tract have been treated in the Hospital for Sick Children, Toronto. Of these, 31 cases were acute pyuria and 21 were persistent pyuria, as determined by intravenous pyelograms. There were 13 patients under 2 years of age, 16 from 2 to 5 years of age, and 23 from 5 to 13 years of age. In this series the organisms present in the urine were *B. coli*, except in 6 cases in which they were *B. paracoli*, 2 cases in which they were *Staph. aureus*, and in 2 cases, dysentery, one of which was a *B. flexneri*. It has been reported that coccal infections in adults are more resistant than those

of the colon group to mandelic acid therapy, but this has not been found to be the case in this series. None of these organisms was resistant to treatment.

Of the 40 patients treated with sodium mandelate and ammonium chloride 50 per cent had a pus-free and bacteria-free urine in from 1 to 7 days after the reaction of the urine was more acid than a pH of 5.8. In 38 per cent sterile urine was obtained in from 8 to 34 days, while in 12 per cent there was no response to treatment. In some, the failure was due to nausea and vomiting of the drug, while in others it occurred where there was kidney retention due to a chronic interstitial nephritis. In these the kidney is unable to excrete the mandelic acid in sufficient concentration to be bactericidal, and large doses of ammonium chloride did not produce the required acidity of the urine.

Of the 12 patients treated with ammonium mandelate, 58 per cent responded to the drug within 7 days, while 42 per cent required 9 to 28 days. In this series only 2 required ammonium chloride in addition to the ammonium mandelate to obtain the required acidity of the urine. The acute pyuria cases responded to treatment more quickly than did the persistent. Also the drugs reduced the febrile period from the usual 7 to 10 days to 2 to 4 days. Infants were more difficult to treat than older children. Of the 13 infants treated only 3 responded to treatment in less than 7 days, the majority requiring 7 to 30 days. There were 2 patients who did not respond to treatment. On the sodium mandelate and ammonium chloride the majority of infants required acidified milk feeding mixture with N/10 HCl. Those infants treated with ammonium mandelate did not require the acidified feeding.

It is well recognized that any acid which passes unaltered through the kidney may produce irritation of the kidney, as shown by gross or microscopic hæmaturia and evidence of kidney retention. Preliminary experimental work on dogs by Helmholtz and Osterberg³ has shown that where mandelic acid was given intravenously there was a transient kidney retention, as shown by increase of blood urea and abnormally low urea-clearance test. Continuation of the drug produced no further harmful effects. Of those treated in this series only one had a transient microscopic hæmaturia, with slight in-

crease in the non-protein nitrogen from 32 to 44 mg. The drug was discontinued and the renal impairment cleared up. In others the non-protein nitrogen was determined before and after treatment and no change was noted. It has been reported that the drug causes vomiting and diarrhoea in 10 per cent of cases. In this series there has been no diarrhoea but several children have vomited. This vomiting may have been due to the ammonium chloride as well as to the sodium mandelate. Brasch⁹ states that it is seldom necessary to continue the treatment longer than 12 to 14 days, as there is a possibility of producing renal irritation. In all cases in this series the drug was continued for at least 3 weeks after the urine became sterile, in the hope of preventing a recurrence, and no irritation occurred. Also, 4 patients were given the drug over periods from 3 to 9 months with no evidence of renal irritation in these cases.

It has been possible to follow 20 cases from 1 month to 16 months. One case was followed 1 month, 6 cases for 2 months, and other cases for 4 months, 8 months, 10 months, 12 months and 16 months. There was a recurrence of the pyuria in 4 cases, or 20 per cent; 2 recurred within 2 months, 2 at the end of 6 months, and 1 had a recurrence 14 months after the first attack, but with further administration of mandelic acid the kidney infection quickly subsided. In 3 cases, or 15 per cent, there was no recurrence of pyuria, but in 1 at the end of 2 months and in 2 at the end of 12 months there was a recurrence of bacilluria. On direct smear there were no pus cells but numerous organisms. These organisms were the same as the original growth obtained from the urine. Thus in 13 cases, or 65 per cent of the cases followed, there was no recurrence of either the bacilluria or the pyuria.

Brasch⁹ reports that mandelic acid therapy was bactericidal in fully 80 per cent of the cases of uncomplicated urinary infection, and failure of bacillary elimination may be attributed to chronic pyelonephritis of long-standing with advanced fibrous changes in the renal pelvis. Of 36 children treated by Newns and Wilson¹⁰ 9 have had relapses. They suggested that perhaps treatment had been discontinued too soon after a sterile urine had been obtained, and recommended periodic short courses of treatment.

COMMENTS

At present mandelic acid seems to be the most efficacious treatment of pyuria in children. In comparison with other forms of treatment it is simpler and yields better results.

In acute pyuria the use of sodium mandelate to clear up the residual bacilluria is not so important as in persistent pyuria, as there is not the same possibility of its recurrence. In persistent pyuria we are dealing with anomaly of the urinary tract as well as an acute interstitial suppurative nephritis, and in many of these cases surgical intervention is necessary to allow free drainage of urine. In our experience we have not been able to cure the bacilluria with surgical treatment alone, and though the pyuria is cured in the majority of cases, the cultures of these urines still grow the original organisms. Knowing that a chronic nephritis can result from a kidney infection associated with a urinary anomaly, it is realized that the focus of infection in the kidney should be removed. This may either be done by the ketogenic diet or by the administration of a salt of mandelic acid. Though the ketogenic diet results in a cure in 66 per cent of the cases treated, it is impracticable in so far as the majority of cases treated by it require hospitalization, and during the course of the treatment gastro-intestinal upsets may occur. Also it is impossible to treat infants by this method. Unfortunately, the use of sodium mandelate has its limitations in cases in which there is kidney retention associated with an anomaly of the urinary tract and persistent pyuria, but irrespective of this it is worthwhile giving it a trial, as the child with a non-protein nitrogen of 44 mg. had a sterile urine at the end of 34 days, which remained sterile for 12 months.

SUMMARY

1. A series of 52 cases of pyuria, of which 21 cases were persistent pyuria, were treated with either sodium or ammonium salt of mandelic acid. The youngest child in the series was $2\frac{3}{4}$ years of age, while the eldest was 13 years.

2. Forty patients were treated with sodium mandelate and ammonium chloride. In 50 per cent of these the urinary infection cleared up and the urine was sterile in from 1 to 7 days. In 38 per cent it required from 8 to 34 days of treatment. In 12 per cent there was no response

to treatment. The remaining 12 were treated with ammonium mandelate. Of these 58 per cent responded to the drug within 7 days, while 42 per cent required 9 to 28 days.

3. Twenty children were followed for a period of 1 month to 16 months. There was recurrence of the pyuria in 20 per cent, recurrence of the bacilluria in 15 per cent, while in 65 per cent there was no recurrence.

4. Failures occurred in cases in which there was a chronic interstitial nephritis secondary to some anomaly of the urinary tract, intolerance to the drug, and inability to produce and maintain a urinary acidity more acid than a pH of 5.8.

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THE MENACE OF SODIUM BICARBONATE—PLEIONEXY

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TWO recent occurrences again called my attention to the misplaced faith of the laity in the efficacy of sodium bicarbonate for the relief of gastric distress. The first concerned a man of 70 years, who spent most of one night taking doses of baking soda in water because of severe epigastric distress. It was not until his stomach became greatly distended, due to the accumulation of carbon dioxide gas and coincident pyloro- and cardio-spasm, and his respirations so decreased in volume that he was unable to speak, that medical aid was sought. Relaxation of both pylorus and cardia was accomplished, with expulsion of the accumulated gas through natural passages, and relief of intragastric tension and epigastric pain. He has since become fully convinced of the disadvantages of baking soda and of the superiority of other available preparations.

The second occurred a few days later, when a patient whose primary complaint was of a minor surgical nature, gave a history of the use of soda because of epigastric pain. The result was vomiting and a feeling of faintness for some days after the last attack of pain. For some months he had been using a powder containing an unknown proportion of soda. His former physician had been so impressed by the characteristics his gastric symptoms were assuming that he had referred him to a cardiologist, who, after careful studies, found no evidence of any

vascular or myocardial lesion. It is certain that the thought that sodium bicarbonate might have been an aggravating factor was not entertained.

Both these men demonstrated a firm belief in the efficacy of a common substance, although failure had been noted and the substitution of other preparations effected definite relief. It was for epigastric distress, in one instance considered anginal in nature, that soda was being used. The discomfort noted following the use of soda, whether vomiting or belching occur, and the great distension observed in the first patient, the direct result of using sodium bicarbonate in the presence of cardio- and pyloro-spasm, have indicated on these and other occasions that there are times when soda, whether taken alone, or in some advertised preparations, relaxes neither the pylorus nor the cardia, and merely intensifies a condition that might otherwise be simply treated.

Other instances of the failure of sodium bicarbonate, whether taken alone or in a powder containing other carbonates, have been noted, usually when the substance has been taken not for the first time and without medical supervision. The common sequence appears to be, first, discomfort or pain, then the taking of soda for relief, often by the teaspoonful dose, then weakness or faintness or collapse; shortly after, when the primary condition has not been

improved but definitely made worse by the soda, the summoning of a physician, to many of whom soda appears so free from harm that clinical studies of its results are scarce. Although some physicians are aware of its aggravating influence when used for acute gastric conditions, it is not uncommon to learn that after the taking of soda sudden death or collapse occurs. The conclusion may be reached that the primary condition, not the aggravation observed after soda, is anginal in nature, and not that soda is a dangerous drug.

Although the local effects are shown by the failure to relieve cardio- and pyloro-spasm and distension, the general effects have received little attention. Instances of tetany have been reported following its use, and, while appreciation of this condition and its causes is encountered, the knowledge of the harmful effects of soda is found in physiological studies apparently far removed from the realm of the gastroenterologist and cardiologist. Without a knowledge of Barcroft's studies, it is difficult, if not impossible, to understand the danger of such a simple, common substance. Yet the danger exists there, as with carbon monoxide, for each substance interferes with the discharge of oxygen by the circulating hæmoglobin. In this fact lies all the danger of sodium bicarbonate. Barcroft¹ showed that sodium bicarbonate was highly pleionectic in its action upon hæmoglobin. Pleionexy is that condition of the circulating hæmoglobin in which it holds on more firmly to its gathered oxygen than in the normal condition (mesonexy), and so gives off less oxygen to the tissues than normally. When pleionexy is present, whether induced by sodium bicarbonate, dibasic sodium phosphate, or diminished carbon dioxide content,¹ the tissues fail to receive enough oxygen for their needs, and tend to fail in proportion to their oxygen requirements and the degree of the lag of oxygen supply behind oxygen demand. With the onset of pleionexy occurs the development of the anoxæmic condition, which the organism may or may not survive.

The effect of sodium bicarbonate in producing pleionexy is in proportion to the amount absorbed and the ability of the organism to withstand the degree of anoxæmia so produced. Not all degrees of anoxæmia are dangerous, but all tend to produce tissue breakdown, whether the anoxæmia is produced by a rarefied altitude, strenuous muscular exertion, or decrease of the

oxygen-carrying power of the blood through sudden severe bleeding. Failure is inevitable if the tissues of the individual cannot endure the anoxæmic breakdown.

Barcroft's finding does not appear to be known to the general medical public, although of fundamental value and of important therapeutic significance. Sodium bicarbonate shifts the dissociation curve of hæmoglobin to the left,¹ decreasing oxygen supply to the tissues, producing pleionexy, a condition which as a result of treatment does not appear justifiable, as immediate interference with oxygen supply follows its absorption.

MacLeod,² studying the lactic acid concentrations in anoxæmia and shock, found in animal experiments that ingestion of sodium bicarbonate with food was followed by an increase in the lactic acid content of the blood and urine. As it is accepted that an increased lactic acid content is a definite indicator of the anoxæmic state, MacLeod thus confirmed Barcroft's observations upon pleionexy by showing that anoxæmia followed the use of sodium bicarbonate. The danger of soda lies in the fact that a large dose may suddenly produce, as can exertion, a degree of anoxæmia that the individual may not be able to survive.

McVicar³ noted the high colour of the lips and cheeks in gastric tetany patients, a feature "probably due to the high percentage of hæmoglobin in the blood and the decreased vasomotor tone of the blood vessels". This feature could also be accounted for by the high saturation of hæmoglobin by oxygen, a feature of the pleionectic state often attributed to "acidosis". The blood holds on to its oxygen, the normal production of carbon dioxide is decreased, and cyanosis may be absent even at the time of failure.

SUMMARY

Although some physicians are aware of the dangers of sodium bicarbonate, having learned by observation the not uncommon sequence mentioned, it seems desirable that Barcroft's finding of the pleionectic tendency of sodium bicarbonate should be more widely circulated, in order that it may be clearly recognized that the danger from sodium bicarbonate can be expressed in one phrase, namely, its anoxigenic capacity, or capacity to produce the condition of anoxæmia (synonym—*anoxia*), the result depending upon the dose administered and the

resistance of the individual to the tissue breakdown due to oxygen deprivation.

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SILK TECHNIQUE: ITS RÔLE IN WOUND HEALING*

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IN the days before asepsis, when all wounds, unless by fortunate chance, became infected, heavy silk and linen sutures undoubtedly caused persistent infection and chronic sinus formation, and finally had to be removed. Doubtless at that time the ideal suture was one which would be absorbed and allow the wound to heal, eliminating to a large extent these persistent sinuses and the necessity of removing the sutures later. Catgut was such a suture, and has become almost universally accepted as the ideal suture—this in spite of the well appreciated difficulty in sterilizing and the high cost. Deaths from tetanus and infected wounds have frequently been proved to be due to catgut. This has led to greater efforts to sterilize catgut effectively, but seldom to a search for a better suture material.

Halsted¹ in America, and Kocher in Europe were not satisfied with the high percentage of wound infection in so-called "clean" cases, and experimented anew with silk. Almost fifty years ago they both recorded fewer infections and more kindly wound healing by using silk sutures in place of catgut. In 1913, after many years of careful observation and experiment, Halsted published his classical paper on the uses and advantages of silk as a suture material, stating at that time, "The relatively high cost of catgut, its bulkiness, the inconvenience attending its use and sterilization, its inadequacy, the uncertainty as to the time required for its absorption, and the reaction it excites in a wound induced me to discard it completely in clean wounds in the surgery of the human subject and of the animal."

It may be taken for granted that every surgeon has as his highest aim the desire to obtain kindly wound healing. The dread of infection is ever present. Few surgeons, how-

ever, question the perfection of their technique; it is one of the things they take for granted. In how many clinics, year in and year out, have such accurate observations on wound infection been made as were reported by Meleney!² His careful work suggests that form of genius which is the art of taking infinite pains, and this work has caused him to abandon his former faith in catgut to become a disciple of Halsted's silk technique.

With the development of aseptic surgery catgut became frequently the medium through which infection was introduced into the wound. Numerous articles have shown the impossibility of guaranteeing sterile catgut. Catgut is a foreign "protein" and therefore irritating. It has to be liquefied and absorbed by the tissues surrounding it, and this is accomplished by the response of the tissues to this irritation. This produces an exudative inflammatory reaction around a necrotic base and an irritating foreign body (the suture), creating a perfect culture medium. It has frequently been shown that healthy tissues can handle a certain amount of bacterial contamination, but in the presence of necrosis this ability is greatly limited. Such an unfavourable situation is produced when large bites of tissue are ligated (or strangulated) by heavy catgut.

Clock³ has shown that all brands of catgut he tested, both domestic and foreign, were never uniformly sterile. He states that so-called sterilization by any method yet devised is inefficient and unreliable. Carefully controlled heat sterilization is the only reliable and positive method. His results prove conclusively that the danger of non-sterile sutures still exists, thus jeopardizing the reputation of the surgeon and hospital as well as the welfare and life of the patients.

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In addition to its irritative action and its possibly infective state catgut is unreliable as to its time of absorption and the possibility of the knots slipping. When an abdominal wound is re-opened a week or even ten days after being sutured with catgut, the catgut is found lying loose, swollen, and partly liquefied in the deeper layers, surrounded by exudate and occasionally frank pus. This is not visible on the surface when the skin is well healed. The muscle layers, however, show no strength and are readily separated with the finger. The less the surgeon has studied wound healing, the heavier the catgut he is likely to use. Frequently two layers of double No. 2 chromic catgut are used, and the final knot is tied with six strands. Such a knot takes weeks before it is finally absorbed and the site it occupied healed over. During this time a foreign body abscess is present, a perfect culture medium for any contaminating micro-organism. It must never be forgotten that aseptic surgery is aseptic in name only, almost all, if not all, operative wounds being contaminated. Dependence must be placed, therefore, on the natural ability of tissues to combat infection. The fewer the organisms, the better the chance of the tissues to combat them. The less the trauma to the tissues, the smaller the bite of ligated tissue, the more thorough the hæmostasis, and the less irritating the suture material, the fewer will be the infections and the more kindly the healing of the wound.

The recent article of Mont Reid⁴ on wound healing should be read by all surgeons. He quotes Billroth, who stated, "The proper treatment of wounds is to be regarded as the most important requirement for the surgeon." Among the first principles of wound healing is the importance of preventing necrosis and débris in wounds. Healthy living cells have a great power to kill germs; dead cells are helpless against their invasion. This means constant effort to eliminate from wounds all gross necrosis, and the elimination of all germicidal tissues which can kill living cells and thereby assist the growth of germs as well as retard wound healing. This with the maintenance of adequate blood supply plus rest will help wound healing.

An endeavour has been made to show that catgut is by no means an ideal suture material, and the suggestion is offered that fine silk has advantages.

It may be that in the presence of infection an absorbable suture has advantages over the non-absorbable. These advantages, however, have never been shown in clean cases. The ideal suture material is one which can be sterilized by boiling, is uniform, of low cost, and which produces the least tissue reaction. With the possible exception of chrome steel wire, fine silk is the only such suture material. It can be sterilized by boiling, it is uniform in strength, and can be obtained in very fine grades, such as the silk always used for blood vessel suture. The greatest opponents of silk always accept the use of silk as the best material for blood vessel work. The cost is low compared with dependable catgut. Repeated experimentation has proved that it is very much less irritating to the tissues than catgut. In Halsted's laboratory alone this observation was repeatedly confirmed over many years of experimentation.

Meleney,² in a survey of 1,132 cases consisting of thyroids, hernias, and radical breast amputations, found 3 per cent of infections in 526 cases where silk was used. In 351 cases where catgut was used, a total of 8 per cent of infection resulted. Where combined silk and catgut were used the occurrence of infection was also 8 per cent. Vivier (quoted by Meleney) found that in similar parallel wounds, using silk in one and catgut in the other, the catgut wounds always contained more germs than those in which silk was used. Thompson⁵ found that firm primary union occurred in 95 per cent of wounds sutured with silk and in only 90 per cent of similar cases sutured with catgut.

Goff⁶ analyzed wound healing in 3,000 abdominal wounds, and found a marked advantage of silk over catgut, concluding, "In this series of cases the average incidence of faulty wound healing from all causes in clean abdominal wounds closed by absorbable suture material has been 12.1 per cent, while in those closed by non-absorbable sutures it has been 4.3 per cent. Actual infection was 10 per cent with catgut against 4 per cent with silk." Further, he showed that in 245 wounds thought to be contaminated at the time of operation 83.5 per cent of those closed by catgut had faulty union, while only 70 per cent of those closed by silk were so affected. This again shows the lessened likelihood of infection in potentially infected wounds by the use of silk.

Shambaugh⁷ refuted the suggestion that an infected wound sutured with silk suppurates for a longer time than a corresponding one sutured with catgut. In an analysis of 2,360 cases 108 wounds were found to have healed imperfectly, 61 with minor infections and 47 with definite suppuration. A study of these infected cases showed that the use of fine silk with proper technique does not delay the average healing of wounds. Further, infected wounds may heal completely without discharging the silk sutures, but exceptionally the healing may be delayed three to four months as a direct result of the presence of silk in the wound. Further, he found the incidence of infection twice as great with catgut as compared with silk. All reports studied have shown that a careful silk technique results in only half as many infections as occur when catgut is used.

A comparison of the strength of wounds sewn with silk and those sewn with catgut again favours the former. Whipple,⁸ reviewing the advantages of silk over catgut, reported his experimental results in parallel right and left paramedian incisions in rats, using silk on one side and catgut on the other. On successive days following the operation the wounds were excised, and the incision subjected to tension. Invariably those sutured with catgut were the first to part. Sections cut from respective incisions demonstrated the reason for this. Around the catgut sutures pressure necrosis was present surrounded by exudate with considerable small round-cell infiltration, showing well the marked irritation produced by the catgut; and the necrotic foci form excellent culture media for any germs that might be, and usually are, present. About the silk sutures much less inflammatory reaction was present. After the tenth day post-operatively, the catgut became absorbed but the inflammatory foci remained. In the silk wounds of similar date the fibres of the sutures became separated by infiltrating foreign-body giant cells with a minimum of or absent leucocytic invasion, the strand rapidly becoming encapsulated by fibrous connective tissue.

Plain catgut is absorbed from the fourth to the seventh day, or longer. Chromicized gut resists absorption for a longer period of time. The latter, however, is much more irritating to the tissues, the surrounding polymorphonuclear

and lymphocytic infiltration being more intense, but absorption depends upon the surrounding inflammatory reaction, and is hastened by actual infection, which it so often promotes; with the absorption goes loss of tensile strength. Chromic catgut of any size has been shown to be absorbed in whole or in part in five to eight days in infected wounds, and to have lost its tensile strength in four to seven days. Thus disruption of the wound occurs on the seventh to the tenth day. The use of silk, which retains its strength, will prevent this serious complication almost entirely.

The well-known fact, mentioned previously, that necrotic tissue favours infection was shown experimentally by Halsted. Introducing cultures of *Staph. aureus* intraperitoneally in 13 dogs, none developed peritonitis. In 8 others he introduced similar amounts of *Staph. aureus* after ligating a good-sized piece of omentum. Of these 8 dogs 2 died of general peritonitis, 2 developed local abscesses, and 4 remained unaffected.

Tense sutures, and the ligating of large masses of tissue are frequent causes of tissue necrosis in wounds. A surgical technique must be developed which will eliminate these faulty results, and this technique is much more readily maintained by the use of fine silk. The reason is that a fine silk ligature is useless for large bites of tissue. Fine forceps must be used and an effort made to catch only the bleeding point. It ought usually to be possible with a slight pull on the forceps to stretch the vessel, demonstrating that no adjacent tissue has been clamped. One of us (Miller) after the use of both silk and catgut for fifteen years has demonstrated repeatedly that catgut wounds heal more slowly and are more tender and indurated than similar wounds where fine silk has been employed. Repeatedly, patients sit up in bed on the fourth day following sub-total gastrectomy with no pain whatever in their abdominal wounds.

Howes⁹ demonstrated that stomach wounds in rats when sutured with silk were stronger after the third day than those sutured with catgut. Heavy catgut appeared to give no greater strength than fine catgut. The silk wounds also showed no exudation after the fifth day, while with catgut the exudative processes were active until the sixth or seventh day.

Parsons¹⁰ recently reported the results of an investigation by Longacre of the Presbyterian Hospital of New York. Longacre reviewed the results of 702 cases of herniotomy, 244 repaired with chromic catgut and 458 with silk. In the catgut series the percentage of recurrences was almost four times that of those in the silk series. The better wound healing and lessened infection were the factors responsible for the improvement where silk was employed. The other variables, such as the operator, type of operation, and type of patient, appeared to be the same in both series.

Sufficient has been said to make surgeons realize that catgut is a much less efficient suture material than silk. In clean cases the small ligatures never cause later trouble. The silk used must, however, be fine silk. If heavy silk is used the same errors creep in which are the rule when catgut is used. Large bites of tissue ligated under tension lead to tissue necrosis. A careful operative technique must be developed based on a thorough understanding of wound healing. The best in aseptic technique must be routine. The minimum amount of tissue must be crushed in forceps and ligated, preferably the vessel alone. The finest silk possible should be used. If the occasional ligature does not break the silk is too heavy. The use of small needles, the taking of small bites of tissue, and tying firmly but not too tightly, are essentials. In early trials with silk technique the surgeon always gravitates to heavier silk, but with practice and attention to detail he soon demands the finest silk, and the use of heavy silk "hurts him more than it hurts the patient". The technique takes more patience and more time, but the improved results are more than adequate recompense.

It may be that silk will in time be displaced by chrome steel wire as the ideal suture material. Described by Babcock,¹¹ it has been shown by Cone and Norcross, of the Montreal Neurological Institute, to be almost non-irritating to tissue, and is used considerably by Cone in his neurological cases. Our own experience is not sufficient on which to base an opinion, but in one case following a gastric operation the wound had to be re-opened on the tenth day and it was found to be completely healed with a strong scar, the small sutures being completely encapsulated. Only with difficulty could the wound be re-opened. This is a finding we have never

observed in re-opening a wound sutured with catgut. The wire is much more difficult to handle than silk, the knots being more difficult to tie and the wire tending to kink, which makes it catch in the tissue. It is essential to cut the wire at the knot as otherwise the ends irritate the skin. In one case we had to remove them on this account. Chrome wire is being largely used in the Royal Victoria Hospital to replace silver wire in orthopaedic and fracture cases.

Cone and Norcross have made identical sections through tissue sutured with heavy and fine chrome steel wire, silver wire, fine silk, and No. 0 catgut. A section of muscle was tied with these different ligatures in the quadriceps femoris of a monkey. On the thirteenth day the animal was killed and sections prepared to show the tissue reaction to each material. The steel wire showed marked fibroblastic organization with little exudative reaction; the silk showed more exudative reaction; and the fine catgut showed the most marked exudative inflammatory reaction.

Theoretically, then, it would appear that chrome steel wire produces the least inflammatory (exudative) reaction, and the most fibroblastic reaction, and from this point of view is perhaps the ideal suture material. In practice silk is quite satisfactory, cheap, easier to handle than wire, produces little exudative reaction, and an early strong fibrosis. It lies in the tissues without causing later annoyance. It can be sterilized by heat. The use of fine silk leads to a more careful, more gentle, surgical technique, helping the surgeon to obey the laws which favour kindly wound healing. Infection following its use is half that following the use of catgut. It is important to remember that in infected cases silk may cause sinuses which persist until it is removed. For this reason we use catgut routinely in the presence of infection.

SUMMARY

A plea is offered for a more extensive use of fine silk as a suture material in clean cases. Its use will lessen infection, give earlier and greater strength of wound, with lessened danger of immediate and late herniation. Its use in hernial repair will halve the percentage of recurrence. In our personal experience its use lessens the duration of hospitalization. The advantages of fine chrome steel wire are men-

tioned, but the use of silk is advocated as the ideal routine suture material in clean cases.

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PRURITUS GINGIVÆ

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PRURITUS has been described as a symptom in various disorders. The term designates "itchiness", and this may be present in many locations, the most common being the anus, vulva, head, arms, legs, and between the fingers and toes. A search of the literature fails to record itchiness in the gums. This report is designed to describe several cases in which this symptom was significant, and the term "pruritus gingivæ" was coined in this connection.

This report is limited to 5 cases. In 4 of them sugar was found in the urine, and blood examination revealed a delayed sugar tolerance. With these findings as a basis, one might suspect this symptom when associated with other criteria in the diagnosis of diabetes.

CASE 1

A male, aged 42, French Canadian, married, complained of itchiness in his gums. Abscesses on his nose and ears were also noted. The physician in charge attempted treatment of these abscesses by medication but without success. Oral prophylactic treatment did not prevent the itchiness in the gums. The patient was referred to me for diagnosis and treatment. He was subjected to the routine physical examination of the mouth, including a complete set of oral radiographs. His daily diet was recorded for seven days. A nasopharyngeal smear and a stool were cultured aerobically and anaerobically, the former on a blood plate and the latter on a MacConkey plate for possible lactose-negative organisms. The urine was examined for albumin and sugar.

The results of the various examinations were as follows. Oral cavity.—Teeth, gums, tongue, cheeks, tonsils, floor of the mouth, roof, essentially negative, except for itchiness in the gums. X-ray of the teeth was negative. Diet.—A rather high intake of carbohydrates and fats was noted. Nasopharyngeal culture.—*S. viridans*, staphylococci, pneumococci, and an occasional colony of hæmolytic streptococci, but too few to be of any significance. Stool gave *B. coli*. The urine was negative for albumin; sugar, 2 plus.

As a result of these findings the patient was prescribed a diabetic diet. The itchiness in the gums disappeared within a few days and the abscesses on

his nose and ears cleared up. Six months after this dietary regimen was instituted the itchiness and abscesses had failed to recur.

CASE 2

A female, aged 33, Jewish, married, complained of itchiness in the gums, also between the fingers of her right hand. The positive findings in routine examination revealed sugar in her urine and a delayed tolerance of the blood sugar. A diabetic diet prevented both these symptoms from recurring after a period of five months.

CASE 3

A male, aged 35, Jewish, married, complained of itchiness in the gums after strenuous exercise, and, with irregular periodicity, pruritus over the right clavicle. The only positive finding was a delayed sugar tolerance, and a diabetic diet cleared up both these symptoms within a few days and did not recur since then. The patient was last seen seven months ago.

CASE 4

A female, aged 58, married, complained of itchiness in the gums, also an ulcer on the forehead which would not heal. This ulcer was caused accidentally in a beauty parlour while having her hair waved. Blood sugar tolerance and urine analysis revealed a somewhat advanced case of diabetes. A diabetic dietary regimen was instituted, and protamine insulin prescribed. The gums and ulcer have cleared up, and symptoms have not recurred in the past five months.

CASE 5

A female, aged 35, Jewish, married, complained of occasional pruritus gingivæ with a rash on her lips. The routine examination was essentially negative. The blood sugar was well within the normal range and the urine was free from albumin and sugar. Careful questioning elicited the information that symptoms appeared only after the use of a certain popular brand of tooth paste. The patient was instructed to change to another paste and the symptoms failed to recur after one year.

This case is offered primarily to show the difference in etiology between case 5 and the other four cases, also to stress the importance of the differentiation between allergic manifestations of drug idiosyncrasy and those due to a disturbed sugar metabolism.

In this report certain facts stand out rather prominently.

1. The importance of an adequate oral examination particularly in respect to systemic disease.

2. Pruritus gingivæ is probably more prevalent than we are aware of, and should be looked for in routine oral examination.

3. Pruritus gingivæ, though strongly suggestive of disturbed sugar metabolism, must be differentiated from drug idiosyncrasy in the absence of infection in the oral tissues.

4. Three of the five patients were of Jewish extraction.

REPORT OF TWO CASES OF POSITIVE WASSERMANN REACTION IN THE ASCITIC FLUID

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POSITIVE Wassermann reactions in ascitic fluid are probably always related closely to syphilis of the liver of the gummatous type. The behaviour of the ascitic fluid is much like that of the cerebrospinal fluid, in that positive reactions may persist in the fluid long after treatment or time has rendered the blood Wassermann-free, and, as in certain doubtful cases of cerebrospinal disease, a positive Wassermann test in the cerebrospinal fluid may explain the doubtful symptoms, so it has been found in many cases with hepatic enlargement and ascites that the serological results have given the clue to what has seemed to be an obscure disorder.

One's first impression on finding positive reactions in the ascitic fluid is that probably some chemical constituent of the exudate may be responsible for the striking serological findings, rather than that the report means syphilis of the abdominal cavity or liver. Perusals of the various textbooks dealing with the Wassermann reactions,^{1, 2} however, show that those most interested in the subject consider a positive Wassermann reaction in the ascitic fluid to mean syphilitic infection, and one can refer to a number of reports already in which this interesting finding is taken as indicating that syphilis of the liver exists. The majority of the syphilologists are unanimous in insisting that in no cases of ascites should one omit to test the ascitic fluid for the Wassermann reaction.

Whether positive Wassermann reactions in ascitic fluid mean that a gumma of the liver is in direct communication with the abdominal cavity or not can hardly be said. The great probability, however, is that in all massive gummata of the liver, secretion from the gumma itself must find its way into the abdominal

cavity. One notes that positive Wassermann reactions have been obtained in the secretions from chancres and from pleural and joint exudates.

The two cases which we are detailing showed in addition to the outspoken hepatic symptoms symptoms referable to spinal disease and injury. In the first of them a spondylitis of the cervical and dorsal vertebræ had resulted in very pronounced symptoms and physical signs of nerve root pressure in the hands and arms. In the second a severe trauma of the upper dorsal and cervical vertebræ had produced signs of cord damage with extreme wasting and loss of power in the hands and arms. In the course of the examinations to which the patients were subjected lumbar puncture was done and cerebrospinal fluid, negative as concerns any suspicion of syphilis, was recorded. There was a gradual improvement, with lessening of pain and regaining of power in the first case, while in the second case a paralysis of the muscles of the hands has persisted.

CASE 1

Mr. R. seen with Dr. MacDonald, of Toronto, was a man aged 58 years. He had been a hard worker all his life and a steady consumer of alcohol. He gave the history of very persistent pain in the neck, running down both arms and with this pain considerable loss of power. It had been considered some years previously that a tumour of the spinal cord might exist, but when he came before me the thickening of the small joints of the hands and the very evident changes in the cervical and dorsal spine seemed to make the diagnosis of spondylitis and arthritis very certain. There were no tophi, though the possibility of gout had been entertained. He remembered having had a venereal infection when a young boy, but his blood Wassermann test had been persistently negative. He had been a very heavy smoker and it had been known that for many years he had had considerable elevation of his blood pressure, the figures being 160/120. Other than the arthritic symptoms nothing was complained of for about four years, when

he appeared before me complaining of hæmatemeses, of swelling of the abdomen, loss of appetite, with morning vomiting and very distinct loss of strength. He had further noted that from time to time there were waves of fever lasting for five days at a time.

Under observation, fluid accumulated rapidly in the abdomen; his legs began to swell, a very typical hepatic facies presented itself, and after a necessary aspiration of the ascitic fluid the spleen could be felt and the liver was noted to be large, hard and nodular. There was a slight yellowish tint to the body and eyes; the blood serum was distinctly yellowish, with the icteric index distinctly raised, and an indirect positive van den Bergh reaction was present. The fluid removed from the abdomen was of a clear straw colour. No suspicious cells were noted and no tuberculosis developed after the inoculation of the fluid precipitated into a guinea pig.

At the time of the second aspiration of the abdomen a few weeks subsequent to the first, a large amount of fluid was removed, and again after the removal of the fluid the much enlarged liver and spleen were easily felt. A friction rub developed over the prominent right lobe of the liver and in a short time was generalized over most of the liver area. Little by little this friction spread upwards into the chest, and in about a month could be heard over the lower two-thirds of the right lung. Signs of fluid in the chest were noted at about this time, but there was never enough fluid collection in the chest to obliterate the well marked pleural rub, and at most of the examinations at this time a loud friction could be heard from the lower border of the liver up to the middle of the right scapula. The report from the second specimen of ascitic fluid was returned to us with "Wassermann positive, 4 plus", and, with the clinical signs before one, it was felt that a large gumma of the liver had possibly pushed through the diaphragm up into the pleural cavity. Pictures showed nothing but dense shadows involving the lower two-thirds of the right chest.

With the Wassermann report so strongly positive immediate treatment with mercury and iodine was instituted, and one was gratified to see almost immediate improvement. One further aspiration was necessary, and again the report of "Wassermann 4 plus" was returned in connection with the fluid. The fever waves which had been most persistent now disappeared, as did the swelling of the legs, and after a fourth aspiration, still positive for the Wassermann reaction there was no further accumulation of fluid in the abdomen. The friction rub disappeared from the chest and in short order all signs of pleural involvement disappeared. The last note said "There is no sign of venous engorgement; liver is distinctly smaller; spleen can be felt; the appetite is returning and though he is very weak and thin he is better in every way. There is no vomiting, and though in the early part of his illness he had had an active hæmatemeses there has been no recurrence of this symptom and he has improved to the extent of being able to get back to his work." Instructions had been given that he was on no account to have intravenous medication, but unfortunately falling into the hands of an over-enthusiastic physician this form of medication was urged, and I was informed that after the third or fourth injection an acute illness developed and the patient died.

CASE 2

Seen with Dr. Van Wart, of Fredericton, N.B., to whom I am indebted for the privilege of reporting it. Mr. C., aged 30, was admitted to the Fredericton Hospital with the history of having had a severe crush of the chest and of the upper part of his spine. There was fluid in the chest immediately after the accident, and little by little the small muscles of the hands

began to waste and lose their power. The patient complained persistently of some soreness in the neck, and with this symptom, and with the wasting of the hand muscles, damage to the spinal cord was thought of. Nothing, however, was found on lumbar puncture to suggest an inflammatory or other condition affecting the cord. An x-ray of the bones of the neck showed a very marked osteoarthritic condition rather than a fracture, though it is possible that both conditions existed. After some four or five months subsequent to the accident fluid began to accumulate in the abdomen and he developed œdema of the legs. There were no other signs of symptoms suggestive of a cirrhosis of the liver. There was no jaundice, no distension of the veins of the abdomen, no suggestion in his facial appearance of alcoholism or of a progressive condition in the liver. It was noted that his left pupil was smaller than the right but he insisted that this variation had existed since birth.

Although there was no history of venereal disease the question of syphilis of the liver was thought of, even in the absence of a palpable liver and spleen. It was also felt that one must consider the possibility of thrombosis of the portal vein as a result of his accident, and finally consideration was given to the possibility of tuberculosis or malignant disease of the peritoneum.

For weeks very little change was noticed in the man's condition. He looked fairly well. There was no evident anæmia. The abdomen was abnormally distended and the legs swollen. There was no jaundice. The van den Bergh reaction was returned as being persistently of normal range, and eventually when the abdomen was emptied of fluid only a very slight enlargement of the liver and spleen could be made out.

With the recollection of Case 1 in one's mind it was suggested that the Wassermann test on the ascitic fluid should be done at the time of the next aspiration. This was seen to and the report came back, "Wassermann positive 4 plus". The blood in this case also showed a positive reaction, and one was interested in hearing a few weeks later that rapid improvement took place with the use of mercury and iodine; the ascites and œdema of the legs completely disappeared, though, as might be expected, but little change could be noted as concerned the impaired power of his hand muscles.

This short report of two most interesting cases indicates clearly that no examination of ascitic fluid can be considered complete unless a report upon the Wassermann reaction of the exudate is included. In Case 1 the clinical findings suggest that a massive gumma was pushing upwards into the chest. In Case 2 the actual signs of liver involvement were never so clear, and the ascites and œdema of the legs were all of distinctly obscure origin. In Case 1, again, the dangers associated with intravenous injections of arsenic in cases of hepatic syphilis are certainly suggested, for the patient had been progressing favourably under the simpler treatment of mercury rubs and iodine by mouth. Such dangers have often been pointed out by those interested in the question of hepatic syphilis. Both cases are of interest in that they were complicated with spinal lesions, lesions not usually associated, however, with cerebrospinal

syphilis, and the results of lumbar puncture seem to indicate that cerebrospinal syphilis did not exist.

One might conclude by saying that all who write authoritatively on the question of Wassermann reactions say that such reactions in ascitic fluid indicate the presence of syphilis, and that no ascitic fluid should be disposed of

without the possibility having been taken into consideration that syphilis of the liver is responsible for the collection of fluid in the abdomen.

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PNEUMOCOCCUS TYPING IN THE PUBLIC HEALTH LABORATORY

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IT has been shown that in order to obtain satisfactory results in the serum treatment of pneumonia the early administration of the homologous antipneumococcus serum is essential. Therefore, in a given case of pneumonia, a rapid diagnosis of the exact type is needed. In the Neufeld test we have such a diagnostic aid.

In this communication we wish to report on the results of pneumococcus typing on over 1,000 separate individuals. These tests were carried out on sputa and pathological fluids submitted by private practitioners from Toronto and rural areas as far distant as 200 miles from Toronto. Of the specimens received 40 per cent were from Toronto and the remainder rural in origin. The typing was done at the Central Laboratory of the Department of Health of the Province of Ontario.

Method of typing.—The sputum or other fluid suspected of containing pneumococci is typed directly by the Neufeld method against rabbit sera prepared from all the pneumococcic types of Cooper. If one cannot demonstrate any swollen capsules by this direct method, a mouse is inoculated intraperitoneally with some of the specimen. Four hours later a peritoneal puncture is done with a capillary pipette containing some normal saline, and some peritoneal washings are obtained. These washings are again examined by the Neufeld method. We speak of this examination as the indirect Neufeld test. In the majority of instances if a pneumococcus has not been found directly it will be found after four hours. Occasionally there is a pneumococcus present which will not type. In such a case it is necessary to get the organism from the heart blood of the mouse and identify it by its biological characteristics. We call these

organisms pneumococci (type undetermined). If a pneumococcus is isolated from culture and it is not pathogenic for a mouse an agglutination test is done to determine the type. None of these avirulent types are included in this series. All specimens which contain pneumococci, other than Types I and II, are injected into mice to determine whether or not this is the only type present. When Gram-positive diplococci are found in a spinal or pleural fluid a direct Neufeld test is carried out.

In order to obtain more definite information regarding the various types a questionnaire has been prepared, which is sent to the doctor eight weeks or more after the typing has been done. This period was chosen in order to determine as far as possible the outcome of the disease in the patient. The physicians have made a very satisfactory response. Of 700 queries sent out 567 have been returned. In some instances it was difficult for the physician to follow the patient for this length of time.

Incidence of pneumococcic types in various specimens.—Between 1,200 and 1,300 typings have been done, but a number of these were repeat tests on the same individual. In Table I the results of typing on 1,003 persons are shown. In 15 instances there were more than one type in the sputum of the same person. In Table I only that type which was most prevalent in the sputum is included as the causative organism of the infection.

There were 584 sputa and pneumococci were found in 322, of which 87 (27 per cent) were Type I, 27 (7 per cent) were Type II, and 77 (20 per cent) were Type III. Of 126 pleural fluids 70 per cent were Type I and II. There

were 14 cases of pneumococcic meningitis which were distributed over various types.

TABLE I.
PNEUMOCOCCUS TYPING
Incidence of pneumococcus types in various types of specimens

Type	Sputa	Pleural fluid	Spinal fluid	Total
I	87	81	1	986
II	21	8	1	
III	77	6	2	
IV	24	4	1	
V	33	7	2	
VI	32	2	..	
VII	35	1	1	
VIII	41	2	2	
IX	10	..	..
X	14	..	..
XI	7	..	..
XII	23	3	..	
XIII	10	..	..
XIV	4	1	..	
XV	12	1	..	
XVI	1	..	..
XVII	16	1	1	
XVIII	9	..	..
XIX	17	3	1	
XX	13	1	..	
XXI	5	..	..
XXII	10	1	1	
XXIII	11	..	..
XXIV	8	..	1	
XXV	2	..	..
XXVII	4	..	..
XXVIII	9	1	..	
XXIX	8	1	..	
XXXI	11	..	..
XXXII	1	..	..
Pneumococci (unclassified)	29	2	..	
Hæm. Strep.	60	..	..
Friedländer	4	..	..
No pneumococci	198	..	..
	846	126	14	986
Peritoneal fluid, Type I, 1; Type XIII, 1; eye, Type VI, 1; pericardial fluid, Type I, 1; ear and mastoid, Type I, 1; Type III, 6; Type V, 2; Type XXII, 1; antrum, Type VIII, 1; stool, Type XIX, 1; blood, Type V, 1.				17
Total.....				1,003

TABLE II.
PNEUMOCOCCUS TYPING
Urban and rural distribution of the pneumococcic types in sputa by the direct Neufeld and the indirect Neufeld method

Type	Direct		Indirect		Total
	Toronto	Rural	Toronto	Rural	
I	12	15	3	5	35
II	..	4	..	7	11
III - XXXII	46	52	55	70	223
	58	71	58	82	269

Direct and indirect Neufeld test.—The indirect method includes those tests where a mouse inoculation was required with a Neufeld examination after four hours or longer. We note that in 80 per cent of the pneumonias due to Type I, the organisms were found directly. There was very little difference whether they were from Toronto or from rural districts. In the Types III-XXXII the type was found directly in only 50 per cent of the cases.

DATA FROM QUESTIONNAIRE

TABLE III.
PNEUMOCOCCUS TYPING
SPUTA

Cases and deaths from pneumonia for each type of pneumococcus by sex and cases in which pneumococcus was isolated but no pneumonia was present.

Type	Pneumonia				Not pneumonia	
	Cases		Deaths		Male	Female
	Male	Female	Male	Female		
I	29	20	4	1	..	..
II	12	1	..	..	..	..
III	19	17	2	1	2	2
IV	9	4	1	..	1	2
V	7	11	1	2	..	..
VI	7	8	..	2	4	3
VII	8	2	3	..	2	1
VIII	12	7	..	1	2	2
IX	3	3	1	2	2	..
X	5	3	..	..	2	..
XI	1	1	..	..	1	..
XII	5	5	..	..	1	2
XIII	5	1	..	..	1	..
XIV	1	2	..	..	..	1
XV	5	3	..	..	2	1
XVII	4	2	..	..	2	..
XVIII	1	..	..	..	..	1
XIX	4	7	..	..	..	2
XX	4	3	1	..	..	1
XXI	2	1	..	..	1	..
XXII	3	2	2	1	..	..
XXIII	2	1	..	..	3	1
XXIV	3	2	..	..	..	1
XXV	3	..	..	..	..	..
XXVII	4	..	..	..	1	..
XXVIII	6	2	2	..	..	2
XXIX	3	2	..	..	1	1
XXXI	2	7	1	..	..	1
Group IV	9	11	1	..	2	2
	178	128	19	10	30	26

Incidence of types and mortality.—Of the 567 specimens about which answers were received there were 362 sputa. Among these there were 306 cases of pneumonia from which the pneumococcus was isolated, with 9.5 per cent of deaths. Sixty-five per cent of these deaths were in males. Fifty-six patients in whom pneumococci were isolated did not have a pneumonia. In no in-

stance was a Type I or Type II found where there was no pneumonia.

The 29 deaths were distributed in 13 different types as follows:

Type I.

1. Manager, aged 34, with both lungs involved, died after 4 days with pleurisy and hiccoughs. Temperature was over 105° F.
2. Teamster, aged 54, died of toxæmia.
3. Farmer, aged 50, died in 3 weeks of toxic myocarditis.
4. Man, aged 72, died in 4 days of toxæmia.
5. Labourer, aged 52, had extreme toxæmia. He was not given serum because he was subject to asthmatic attacks.

Type III.

6. Farmer, aged 59, died in 7 days of toxic myocarditis. He was given mixed Type I and II serum without any good effect.
7. Caretaker, aged 69, died in 6 days of toxæmia.
8. Housewife, aged 54, died suddenly in 7 days of embolism.

Type IV.

9. Mechanic, aged 48, died in 19 days of toxic myocarditis.

Type V.

10. Boiler maker, aged 70, developed a bronchopneumonia after an operation for a perforated duodenal ulcer.
11. Domestic, aged 21, had an extensive involvement of both lungs and developed nephritis and myocarditis; death in 14 days.
12. Housewife, aged 49, died of auricular fibrillation in 11 days.

Type VI.

13. Housewife, aged 50. She had a crisis and then several relapses, died after 2 months.
14. Housewife, aged 44, had syphilitic myocarditis and aortitis. She died 21 days after the onset of the pneumonia.

Type VII.

15. Hospital attendant, aged 54, died in 4 days from toxæmia. He had had a previous attack 9 months earlier.
16. Man, aged 69, had diabetes and gangrene. He developed a pneumonia and died in 6 days.
17. Farmer, died one month after the onset. He had pulmonary œdema.

Type VIII.

18. Spinster, aged 66, died in 7 days after the onset of the pneumonia, and the disease terminated as a meningitis. Blood in the sputum was marked.

Type IX.

19. Housewife, aged 34, died in 12 days of a bronchopneumonia.
20. Housewife, aged 40, died of pneumonia following labour.
21. Male died of pneumonia.

Type XX.

22. Garageman, aged 50, died in 10 days. Both lungs were involved.

Type XXII.

23. Housewife, aged 76, died of bronchopneumonia in 28 days. She had a senile dementia.
24. Textile worker, aged 57, died of bronchopneumonia in 45 days. He had an empyema and died of a toxic myocarditis.
25. Milk vendor, aged 58, had both lungs involved. He died in one week of embolism.

Type XXVIII.

26. Farmer, aged 52, died in 17 days. Both lungs were involved and he had a toxic myocarditis.
27. Transient, aged 43, had an empyema on both sides and died after 90 days.

Type XXXI.

28. Labourer, aged 48, died in 3 days of a bronchopneumonia. He had an acute mitral endocarditis.

Group IV (undetermined).

29. Contractor, aged 52, developed a pneumonia after a perforated duodenal ulcer and died over 3 months later.

It is to be noted that a large number of these deaths were in the older age groups. The commonest cause of death as recorded by the physician was a toxic myocarditis.

TABLE IV.

PNEUMOCOCCUS TYPING

SPUTA

Physicians' diagnosis of cases in which pneumococcus was isolated but no pneumonia was present.

Type	Bronchitis	Bronchiectasis	Sinus infection	Pulmonary hæmorrhage	Tuberculosis	Miscellaneous
III			2mm			Normal-1f Pyelitis-1f
IV				1f	2mm	
VI	1m	1f	4fffm		1f	Acute nephritis-1m
VII	1m			1f		Gunshot wound in lung-1m
VIII	1m		1f			
IX	1m	1m				
X	1m		1m			
XI	1m					Pleurisy-1f Silicosis-1m
XII	1m					
XIII				1m		
XIV	1f					
XV	1f	1m			1m	Normal-1m
XVII					1m	
XVIII	1f					
XIX					2ff	
XX	1f					
XXI	1m					
XXIII	1m	1f	2mm			
XXIV	1m					
XXVII	1m					
XXVIII	1f		1f			
XXIX	1m					Normal-1f
XXXI					1f	Lung abscess-1m
Group IV	3ffm					
	20	4	11	3	9	9

m-male f-female

Diagnosis of cases where there was no pneumonia present.—There were 56 cases in which the pneumococcus was isolated but there was no pneumonia present. In 20 of these there was a diagnosis of bronchitis. The majority of these

cases started like a pneumonia but there was no evidence of consolidation and they recovered rapidly. In 35 cases altogether there was an upper respiratory infection. Nine persons had tuberculosis. A number of these showed signs of an upper respiratory infection when the specimen was taken. In 3 cases of pulmonary hæmorrhage a pneumococcus was found but no tubercle bacilli were found on culture.

TABLE V.

PNEUMOCOCCUS TYPING
PLEURAL PUS

Number of cases and deaths of empyema following pneumonia showing type and sex of patient

Type	Cases		Deaths	
	Male	Female	Male	Female
I	43	14	4	1
II	6	..	2	..
III	3	1	..	..
IV	1	..	..	..
V	2	1	..	..
VI	2	1	1	..
VII	1	..	1	..
VIII	1	2	..	..
XII	1	..	..	..
XV	..	1	..	..
XVII	1	..	1	..
XIX	1	..	..	..
XX	..	1	..	1
XXII	1	..	1	..
XXVIII	2	..	1	..
Group IV	2	..	..	..
	67	21	11	2
	88		13	

Incidence of types and mortality in empyema.

—Of 88 cases of empyema due to the pneumococcus 57 (65 per cent) were in Type I, but there were only 39 per cent of the deaths in this type. Seventy-six per cent of the cases and 85 per cent of the deaths were in males. The 13 deaths following empyema were in 8 types as follows.

Type I.

1. Male, aged 18 months, had an empyema with an otitis media. He died in 3 weeks after the onset.
2. Superintendent, aged 48, also had a pericarditis. Four pockets of pus were found in right pleural cavity at autopsy. He died in 35 days.
3. Male, aged 7, died in 3 weeks from the toxæmia of the empyema.
4. Male, aged 2, died after 5 weeks of toxæmia.
5. Female, factory hand, aged 40, died after 2 months. She developed a catarrhal jaundice.

Type II.

6. Farmer, aged 19, had a bronchopneumonia following measles, scarlet fever and rheumatic fever. Died after 60 days.
7. Transient, aged 43, died after 90 days of toxæmia.

Type VI.

8. Male, aged 6, died in 9 days after the empyema was discovered. He also developed an acute nephritis.

Type VII.

9. Farmer, aged 67, died in 14 days with an empyema and a meningitis.

Type XVII.

10. Farmer, aged 57, died in 5 weeks after the empyema was drained.

Type XX.

11. Housewife, aged 39, had bronchopneumonia, empyema and pericarditis.

Type XXII.

12. Textile worker died in 45 days of toxic myocarditis.

Type XXVIII.

13. Transient, aged 43, died after 90 days.

TABLE VI.

PNEUMOCOCCUS TYPING
SPUTA

Incidence and percentage of Type I, Type II, and Type III-XXXII by age-groups in 306 cases of pneumonia.

Age - Group	Type I		Type II		Type III-XXXII	
	No.	Per-centage	No.	Per-centage	No.	Per-centage
0 - 4	2	4.1	..	....	2	0.8
5 - 9	5	10.2	..	....	5	2.1
10 - 19	9	18.4	1	7.7	19	7.8
20 - 29	6	12.3	5	38.4	49	20.1
30 - 39	8	16.3	2	15.4	46	18.8
40 - 49	8	16.3	1	7.7	33	13.5
50 - 59	8	16.3	1	7.7	34	13.9
60 - 69	..	....	2	15.4	23	9.4
70 -	1	2.0	1	7.7	17	7.0
Unknown	2	4.1	..	....	16	6.6
	49		13		244	

Types and percentage by age-groups in 306 cases of pneumonia.—In Table VI are shown 306 cases of pneumonia in which pneumococci were found in the sputum. They are divided by age groups into Type I, Type II, and Types III-XXXII. The number in the age groups 0-9 years should be much larger, but, in the majority of instances, children do not have any sputum. As a result a specimen was not sent to the laboratory. It is advisable to take laryngeal swabs of children suspected of having a pneumonia, and submitting these swabs to the laboratory as soon as possible. Pneumococci can be isolated in many cases by this method. Although such cases were not included in this series, 35 per cent of the Type I cases were under 20 years of age. The cases in Type II and Types III-XXXII were more prevalent in the middle age groups.

TABLE VII.
PNEUMOCOCCUS TYPING
PLEURAL PUS
Incidence and percentage of Type I, Type II, and
Type III-XXXII by age-groups in 88 cases of
empyema following pneumonia.

Age - Group	Type I		Type II		Type III-XXXII	
	No.	Per-centage	No.	Per-centage	No.	Per-centage
0 - 4	13	22.8	..	....	4	16.0
5 - 9	14	24.6	..	....	2	8.0
10 - 19	10	17.6	1	16.6	1	4.0
20 - 29	8	14.0	1	16.6	3	12.0
30 - 39	2	3.6	1	16.6	5	20.0
40 - 49	4	7.0	2	33.6	1	4.0
50 - 59	3	5.2	1	16.6	4	16.0
60 - 69	..	....	..	....	4	16.0
Unknown	3	5.2	..	....	1	4.0
	57		6		25	

Types and percentage by age-groups in 88 pneumococcic empyemas.—Forty-seven per cent of Type I cases were in children under 10 years of age. In contrast to this, about 75 per cent of the Group IV, pneumococcic empyemas, were in persons over 10 years of age. One would conclude that either children are more susceptible than adults to Type I pneumococci gaining entrance to the pleural cavity and producing an empyema, or there are a large number of children with Type I pneumonia and an empyema rate similar to that of adults.

TABLE VIII.
PNEUMOCOCCUS TYPING
Incidence of herpes labialis, delirium and complications
including deaths in 306 cases of pneumonia.

		Type I-II		Type III-XXXII	
		No.	Per-centage	No.	Per-centage
Herpes	Positive	25	40.0	66	27.0
	Negative	27	43.5	128	52.5
	Unknown	10	16.5	50	20.5
		62		244	
Delirium	Positive	31	50.0	75	30.8
	Negative	24	39.0	124	50.8
	Unknown	7	11.0	45	18.4
		62		244	
Complications	Positive	25	40.0	76	31.1
	Negative	30	48.0	114	46.7
	Unknown	7	12.0	54	22.2
		62		244	

Incidence of herpes, delirium, and complications including deaths in 306 cases of pneumonia.—Approximately 50 per cent of the Type I and

II pneumonias had herpes labialis, while 35 per cent of the other Types showed this lesion. About 55 per cent of the cases of Type I and II showed delirium and 35 per cent of the Group IV cases. Complications were 45 per cent in Type I and II, and 40 per cent in the other types.

The complications in the various types may be summarized as follows.

Type I.—Empyema, 4; pleurisy, 1; myocarditis, 1; fibrillation of the heart, 1; arthritis, 1; recurrence, 1; pulmonary abscess, 1; slow resolution, 4; deaths, 5.

Type II.—Empyema, 2; pleurisy, 1; recurrence, 2; slow resolution, 1.

Type III.—Empyema, 4; pleurisy, 2; enlarged heart, 1; slow resolution, 3; deaths, 3.

Type IV.—Bronchiectasis, 1; arthritis, 1; slow resolution, 1; death, 1.

Type V.—Empyema, 2; otitis media, 1; slow resolution, 1; deaths, 3.

Type VI.—Empyema, 1; pleurisy, 2; myocarditis, 1; lung abscess, 1; deaths, 2.

Type VII.—Deaths, 3.

Type VIII.—Pleurisy, 1; otitis media, 1; slow resolution, 2; death, 1.

Type IX.—Deaths, 3.

Type X.—Slow resolution, 1.

Type XI.—Slow resolution, 2.

Type XII.—Intercostal neuralgia, 1.

Type XIII.—Lung abscess, 1.

Type XIV.—Lung abscess, 1.

Type XV.—Pleural effusion, 1; nephritis, 1.

Type XVII.—Slow resolution, 1.

Type XVIII.—Frontal sinusitis, 1.

Type XIX.—Slow resolution, 1.

Type XX.—Slow resolution, 2; death, 1.

Type XXII.—Otitis media, 1; deaths, 3.

Type XXIV.—Pleurisy, 1.

Type XXV.—Slow resolution, 1; toxic myocarditis, 1.

Type XXVIII.—Slow resolution, 2; deaths, 2.

Type XXIX.—Frontal sinusitis, 1; slow resolution, 1.

Type XXXI.—Mitral regurgitation, 1; slow resolution, 1; deaths, 1.

Undetermined types.—Empyema, 1; nephritis, 1; tachycardia, 1; slow resolution, 1; death, 1.

Most of the empyemas were in Types I, II, III, and V. Among the Group IV cases there were quite a number who showed a slow resolution of the lung. These persons were ill from 5 to 8 weeks and the lung cleared very slowly.

Pneumococcic meningitis.—Replies have been received concerning 9 spinal fluids which showed the presence of pneumococci.

Type I.

- Farmer, aged 30. A meningitis followed an ear condition; pneumonia was not present. The ear condition existed for 30 days before the meningitis developed. The patient died in 2 days.

Type III.

- Domestic, aged 65, died of meningitis following a mastoid operation. She had nursed a fatal case of pneumonia 3 months before she developed this ear condition.

3. Housewife, aged 42. Her sickness commenced as a bronchitis and intense nasopharyngitis which developed into a pneumonia. There was herpes labialis and an acute nephritis. She died in 7 days and had a terminal meningitis.

Type IV.

4. Male, aged 50, died of a meningitis following a sinus infection.

Type V.

5. Male, aged 42, had a bilateral pneumonia which came on suddenly. He died in 4 days of a meningitis.

Type VII.

6. Farmer, aged 67, developed a meningitis following a pneumonia and an empyema. He died in 14 days.

Type VIII.

7. Housewife, aged 31. The meningitis occurred following a pneumonia which developed in the puerperium. The patient had influenza 2 weeks previous to confinement. She died 24 hours after the onset of the meningeal symptoms.

Type XVII.

8. Farmer, aged 53. He had both lungs involved with a very acute pneumonia. Herpes labialis was present. He lived for 10 days and died 4 days after the onset of the meningitis.

Type XXII.

9. Shoe factory operator, aged 22. There was no pneumonia but the meningitis came on with a severe headache and drowsiness. He died in 5 days.

Three of these cases were due to an infection of some of the sinuses, and there were 6 which followed a definite pneumonia.

Serum treatment.—The following Type I cases were treated with serum.

1. Male, aged 29, had a lobar pneumonia in the left lung and was given 100,000 units of antiserum. The disease cleared up in 7 days.

2. Male, aged 41, had a bronchopneumonia in both lungs. He was deeply cyanosed, with tachycardia and toxic myocarditis; 80,000 units of serum were given. The patient recovered but was ill for 2 months with the heart complication.

3. Female, aged 35, had a lobar pneumonia and a crisis after 7 days. She then had a recurrence with a further extension and consolidation in the lungs. She was then given serum and in 2 days the temperature was normal.

4. Male, aged 54, was taken suddenly ill with a pneumonia and died in 4 days. He was given some serum on the second day but no information was given as to how much or what effect it had had on the patient.

5. Labourer, aged 46, had a pneumonia of the right lower lobe. He was given 120,000 units of serum in three injections within 12 hours. It was given on the sixth day. The patient was very ill but there was marked improvement 10 hours after the last injection.

6. Jail guard, aged 34, had a moderately severe pneumonia and was given 20 c.c. of serum in 16 hours and the pneumonia resolved rapidly.

7. Farmer, aged 26, had one lung consolidated with a temperature of 104° F. He was given 60,000 units of serum and recovered.

8. Nurse, aged 19, was given 4 intravenous injections of serum within 24 hours. She was ill for 5 days.

9. Student, aged 12, had a temperature of 105° F. with one lung involved. He was given serum and the temperature dropped to 97° F. within 6 hours after the serum was given and remained normal.

10. Student, aged 22, was given an initial small dose of serum but he had a severe thermal reaction and no more serum was given. He was ill for one month.

11. Station agent, aged 38, one lung involved and a temperature of 104° F. After serum treatment the temperature dropped to 99° F. and remained at this level for one week with a gradual recovery.

12. Housewife, aged 36, had a temperature of 107° F. Patient was delirious. One lung was consolidated. Serum was given on the fourth day. After 10,000 units the temperature rose to 108° F. in one hour but after 10 hours was 101° F. She was then given 20,000 units and in 8 hours the temperature was 99° F. and she made a rapid recovery.

13. Factory hand, aged 24, was given 50,000 units. Temperature was 104.5° F. with one lung involved. After the serum was given the temperature fell to 100° F. and remained at this level for one week when it became normal.

14. Farmer, aged 39, had a temperature of 104° F. with one lung involved. He was given 10,000 units of serum. Within 12 hours the temperature fell to normal and remained normal thereafter.

The following Type II case was treated with serum.

15. Cutter, aged 40, had a temperature of 102° F. with one lung involved. He was given 180,000 units of serum. He felt very comfortable 24 hours after the serum was given and recovered rapidly.

Unfortunately, complete data are not available as to when the serum was given in the course of the disease.

From the analysis of these fifteen serum-treated cases, the administration of serum would appear to give very favourable results. In no instance did the physician state that it was of no effect, although there was one case where there was a thermal reaction and the serum was not continued after a small initial dose. A number of the doctors stated that the serum produced marvellous results.

SUMMARY

An analysis is made of 1,003 pneumococcus typings by the Neufeld method on sputa and pathological fluids, and the incidence of the various types recorded. The specimens were from physicians in private practice, and 60 per cent were from rural districts.

Questionnaires were sent to the physicians. In 306 cases of pneumonia due to the pneumococcus there were 9.5 per cent of deaths. In those cases where a pneumococcus was found but there was no pneumonia the majority showed evidence of an upper respiratory infection.

In 88 cases of empyema due to the pneumococcus there were 15 per cent of deaths. Seventy-six per cent of the cases and 85 per cent of the deaths were in males. Fifty-seven per cent were in Type I.

The incidence of Type I in the sputa of children was small as very few laryngeal swabs

were submitted to the laboratory. Of the 88 empyemas, 47 per cent were under 10 years of age in Type I, while in Group IV 75 per cent were over 10 years of age.

The incidence of herpes, delirium and complications is recorded. An analysis of 9 cases of pneumococcic meningitis is made. Of the 49

cases of Type I pneumonia, 14 were given serum and of 13 cases of Type II only one was given serum. Favourable results are noted.

I wish to express my sincere thanks to Dr. A. L. MacNabb, Director of Laboratories of the Province of Ontario, under whose direction this work has been carried on.

THE RADIOSENSITIVITY OF BENIGN SKIN CONDITIONS*

By C. M. HENRY

Regina

ACCORDING to Dr. A. U. Desjardins,¹ Mayo Clinic, radiosensitivity of a cell is related chiefly to its natural life cycle, as lymphocytes, whose metabolic cycle among human cells is the shortest, are the most radiosensitive, and nerve cells, the life cycle of which is the longest, are the most resistant to irradiation. Also, he states that pathological cells are more radiosensitive than normal cells of the same kind, but this is only to the extent that the rate of mitosis is the same. Hence,* for the purpose of this paper, skin tumours come in the middle class, between that of the radiosensitive lymphoid cells, on the one hand, and the resistant nerve cells, on the other.

The term "radiosensitivity" may be defined as a relative susceptibility of normal or pathological cells or tumours derived from such cells to a given dose of x-ray. Estimating the dose of x-ray, whether it be by the roentgen or by the K.V.P. method, to produce an erythema or necrosis on normal skin, and knowing the life-cycle pathology of the benign tumour in relation to the normal cells, one is in a position to estimate the dosage of x-ray required to destroy the growth.

Disappearance may occur either by necrosis or body-tissue absorption. It is beyond the limit of this paper to mention, let alone describe, all of the skin lesions amenable to x-rays. My purpose is to describe a few of the more common lesions met with in every day practice, and name only some others that should receive attention. Radiotherapists should know the value of x-rays in the treatment of benign skin conditions, so

that they can impart this knowledge to the medical profession at large.

Verruca and *clavus* (warts and corns) of all types, hard, soft, or papillomatous, are composed of hyperplastic epithelium, and require a destructive skin-dose of superficial x-ray. Exceptions are the plantar wart, which is much more radiosensitive; this requires about three erythema doses. However, the senile variety is not radiosensitive.

Senile keratosis requires a skin-destructive dose of superficial x-ray, without a filter.

Painful keloids of the skin, following a surgical operation, or from burns, are softened and flattened and rendered painless by treatments with a slightly less than a destructive skin-dose, given at intervals of two to four months. Time should be given for absorption and the formation of soft fibrous tissue. The more severe cases can be reduced in one year. Relief from pain is often experienced shortly after the first application, employing the unfiltered superficial x-ray.

Nævi, either of the flat or cavernous type, respond to x-ray. However, it has proved more beneficial to employ a suitable filter, depending on the depth of the mass, and K.V.P. of 130. Intervals of two to three months between sittings are advisable to allow for fibrosis to occur.

Pruritus vulvæ and *ani*.—This distressing and debilitating condition is always benefited and often cured by either superficial or moderately deep x-ray therapy. If patients can return at ten-day intervals, a skin erythema superficial dose, without filter, is often curative, but if the patient is unable to remain for the fractional treatment, beneficial results may be obtained by giving a filtered dose, using 5 mm. of aluminum,

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with moderate K.V.P. of 130, 12-inch distance, 5 milliamperes, for 25 minutes.

Eczema.—All subacute and chronic cases, as well as intertrigo, respond to superficial x-ray treatment. Eczema in children responds extremely well. Exposures may be given at ten-day intervals, administering from a quarter to three-quarters of an erythema dose. Care should be taken not to over-expose or continue the treatments too long. Sometimes one sitting is sufficient and results are obtained in a week to two weeks. For more chronic forms of the disease repeated exposures every ten days to two weeks are necessary.

Acne vulgaris.—X-ray treatment is a great aid to constitutional treatment, as this condition is usually due to both local and constitutional causes. When other means fail, an erythema dose is given and may be repeated at monthly intervals. If unbenefited, do not expose more than three or four times. I find that the mercury quartz lamp is a splendid aid to the x-ray in securing early benefit.

Furunculosis.—In cases where suppuration has not occurred, one sitting, using an erythema dose and two to three mm. of aluminum filtration, will abort and alleviate pain within twenty-four hours in the majority of cases.

Hyperhidrosis.—The habitual localized forms, as on the hands, feet, and axilla—not the nervous type—respond to the correct dose of x-ray. The dose is equal to an epilation treatment, and one treatment may be sufficient. The treatment, however, may be repeated in one month, if not successful after the first attempt. When satisfactory results are obtained you will have a life-long, grateful patient.

Infectious diseases.—(a) Mycosis fungoides; (b) ringworm of the scalp; (c) sycosis. With these you are well acquainted, and they require a single epilation dose. The treatment should not be repeated, except at a long interval, to prevent the possibility of permanent alopecia. Ringworm of the face in children will often yield to a single dose of a three-quarter erythema intensity.

Impetigo gives a pleasing result a few days after treatment by administering one-quarter to one erythema dose without filter.

Erysipelas.—If local, x-ray treatment is preferable to every other form of treatment. The

results are so astonishing at times that referring physicians doubted their diagnosis. Temperatures of 104 to 105° often fall to normal within twenty-four to forty-eight hours. Pain, swelling, and constitutional symptoms alike disappear and the patient may return to work within one week. The earlier the x-ray exposure can be made over the infected area, the more rapid the result. One exposure only is necessary. From one to two erythema doses are necessary, using a filter of two to three mm. of aluminum, and from 120 to 140 K.V.P. The mercury quartz lamp treatments in erythema doses are also producing good results. Dr. G. E. White² has shown the mortality rate has been greatly reduced since following the later methods of treatment in this morbid infection among young children.

There are many varieties of lesions about the eye which are amenable to superficial x-ray, and as one gains experience in treating superficial skin lesions in other parts of the body, and one knows the exact output in kilovoltage and erythema skin dosage developed by his x-ray outfit, then, and then only, should he feel competent to treat benign lesions about or of the orbital area.

Blepharitis, eczema of the lids, papillomata, keratosis, and many other conditions, both benign and malignant, as described by Dr. Richards,³ respond to x-ray treatment. Some conditions, due to their location, are better treated by radium.

There are also many other skin conditions, infections, and lesions for which x-ray treatment is beneficial. In those mentioned, however, it has been proved that x-rays have either produced a permanent cure, or been an aid in producing beneficial results. However, it should be known absolutely what distance, size of portal. K.V.P., filtration, milliamperage, and time, gives an erythema reaction on the skin, and the dosage be judged accordingly. Underdose rather than overdose, and watch carefully, recording all reactions, and you will treat wisely.

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CHILDHOOD TUBERCULOSIS*

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IN everyday life about a sanatorium the children with their first infection type of pulmonary tuberculosis cause little concern as compared with the adults suffering from phthisis. In this paper the relative simplicity of the childhood type is stressed, but at the same time it is pointed out that even this early phase may be more involved if the unstable and more chronic cases are considered. In addition, it is noted that much of the relative simplicity of childhood type of tuberculosis is lost if one delves into the literature.

It would be a fine thing if one could make satisfying generalizations about tuberculosis, but in every attempt to do this the many exceptions and variations tend to undermine any attempt at conclusions. The very length of a chronic disease makes the study of its complete development difficult and involved. Not only this but in tuberculosis there are so many starters for every one who may complete the course. Many will have to be watched through the years to come, to find the few in whom full development proceeds from start to finish. This is none the less true when one remembers that exposure to exogenous reinfection is probably a very intermittent thing through life, as also are the predisposing stress and strain to which any individual may be exposed. It is then scarcely to be considered strange that the study of the relationship between the benign first disease and the later destructive type may prove confusing. On the other hand, the primary complex found in children seems relatively simple if considered apart from its relationship to the more serious destructive type of adult life. The *discovery* of the disease in this phase tends to be of a routine nature, since a history of contact more often than symptoms brings the child for examination. The *diagnosis* is made by tuberculin-testing and the x-raying of positive reactors. The *treatment* is simple, and provided there is the assurance

of reasonably good care the favourable *prognosis* is easily made. This satisfactory outlook is further justified by the low death rate at this age from pulmonary lesions. The recessive *course* is readily followed by serial x-rays. To sum up, then, the case-finding, the treatment, the prognosis, the course, and, to a less extent, the diagnosis are much simpler than is the case with phthisis. However, among these patients are some showing instability, with spreads from pre-existing lesions accompanied by exacerbations of fever. In others pleural effusion occurs, and in still others there is evidence of prolonged smouldering of the disease, particularly in the lymph glands. This latter reminds us of the warning of Ghon that "this is a field which is with difficulty accessible to all clinical methods, easily recognizable as it is anatomically". This sort of case may go a long way towards justifying institutional observation and care.

There are, too, the difficulties of diagnosis to be thought of. However, if consideration is given to the age of the patient, destructive lesions are much less often seen before puberty than after. While the evidence of involvement of the lymphatic glands is more prominent in children, one has to be careful as to what may be considered abnormal in considering the hilum. Calcium deposits occur more regularly in the primary complex both at the parenchymal and the lymphatic poles, but this comes too late to be of any help in distinguishing the type of early infiltrations. The older the individual, the greater the difficulty, for at puberty and after the lesions tend to be more localized and more often in the upper portions of the lung; lymphatic involvement is less pronounced. For this age the responsibility of the diagnosis of a lesion as primary is greater, for here the destructive lesions are more common and the death rate is so much higher.

Recent literature tends to present this superficially simple phase of tuberculosis as a very complex problem indeed. Some are satisfied that a small dosage suffices to produce these

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lesions, with the course depending more on the variations of resistance than the dosage, while others stress the need of intimate contact with a case of phthisis. One school contends that this type of disease needs little care, and that the outcome is always favourable, while others fail to understand how, in recent years, primary lesions are considered to be invariably benign. They contend that this is not borne out by the facts. Again, in considering the white population after the age of fifteen, the first exposure to tuberculosis is said to produce lesions of the adult type invariably. On the other hand, others feel that, regardless of age, primary disease is considered to be invariably benign, whether it

occur in the adult or in the child. First infection is defended for the immunity it produces, condemned for rendering the tissues sensitive, or simply regarded as the initiation of a progressive disease that is uninfluenced by exogenous reinfection. Some have swung from a solicitous care for all children reacting to tuberculin to the other extreme of more or less disregard of the ailing child. In the meantime, perhaps a more conservative course might be indicated, and, locally, this is being followed, namely, in providing beds for the children with easily demonstrable lesions of an active type whose homes offer no reasonable outlook for proper care.

AN EXAMINATION OF THE MOUTHS OF ESKIMOS IN THE CANADIAN EASTERN ARCTIC

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THE clinical findings recorded below were obtained during the Canadian Eastern Arctic Patrol of 1937, on the R.M.S. *Nascopie*. Although the examinations were made with another object in view the results are deemed to be of sufficient interest to merit publication. An attempt will first be made to define the terms used in this report, in order that one important and usual source of confusion may be eliminated.

TABLE I.

FIFTEEN CASES EXAMINED AT WOLSTENHOLME,
QUEBEC, HUDSON STRAIT

Apparent age males	Type	Teeth missing	Dental caries	Pyorrhæa	Sordes	Tonsils	Tongue
6	Relatively pure Eskimo	1	Nil	Nil	Nil	Very small	Clean
17		None	"	"	"	"	"
19		"	"	"	"	"	"
27		"	"	"	"	"	"
27		"	"	+	"	"	"
28		"	"	Nil	"	"	"
30		"	"	++++	"	"	"
38		"	"	Nil	"	"	"
40		"	"	++++	"	"	"
40		"	"	++++	"	"	"
45		"	"	+++++	"	"	"
45		"	"	+	"	"	"
50		"	"	+++++	"	"	"
50		"	"	+++++	"	"	"
51		3	1	+	"	"	"

Apparent age.—No native encountered knew how old he or she was. The ages given in the tables are estimates as judged from the patient's appearance in terms of white man's age.

Type.—The Eskimo habits of life have for long so differed from ours that it would seem important in any examination of their health to try to establish whether the patient is a relatively pure type or not. The author had had no previous experience, and it was only possible to note gross deviations. Cases where there was obviously white or negro blood in the ancestry have been listed accordingly; the

TABLE II.

EXAMINATION OF 9 CASES FROM CAPE DORSET,
BAFFIN ISLAND

Apparent age		Type	Teeth missing	Dental caries	Pyorrhæa	Sordes	Tonsils	Tongue
M.	F.							
	22	Relatively pure Eskimo	None	Nil	Nil	Nil	Very small	Clean
	25		2	1	"	"	"	"
	28		None	Nil	"	"	"	"
	30		"	"	"	+	"	"
36			1	1	"	N.I.	"	"
37			None	Nil	"	"	"	"
40			"	"	"	"	"	"
	45		3	"	"	"	"	"
	50		9	"	"	"	"	"

TABLE III.
EXAMINATION OF 82 CASES AT PANGNIRTUNG, BAFFIN ISLAND

Apparent age		Type*	Teeth missing	Dental caries	Pyorrhæa	Sordes	Tonsils	Anterior cervical glands	Tongue
M.	F.								
14	4	White	None	Nil	Nil	Nil	Very small	Nil	Clean
	4		"	2	"	"	"	"	"
	5		"	Nil	"	"	"	"	"
	5		"	"	"	"	"	"	"
	6		"	"	"	"	"	"	"
	9	White	"	"	"	"	"	"	"
	12		"	"	"	"	"	"	"
	14		"	"	"	"	"	"	"
	14		"	"	"	"	"	"	"
	15		"	"	"	"	"	"	"
16	15	Negroid	1	Nil	Palpable	Nil	"	Palpable	Dirty
	16		1	Nil	"	"	"	"	Clean
	16		None	Nil	"	"	"	"	"
	16		None	Nil	"	"	"	"	"
	16		None	Nil	"	"	"	"	"
	16	Negroid	"	"	"	"	"	"	"
	16		"	"	"	"	"	"	"
	16		"	"	"	"	"	"	"
	16		"	"	"	"	"	"	"
	16		"	"	"	"	"	"	"
17	17	White	"	"	"	"	"	"	"
	17		"	"	"	"	"	"	"
	17		"	"	"	"	"	"	"
	17		"	"	"	"	"	"	"
	17		"	"	"	"	"	"	"
	18	Negroid	"	"	"	"	"	"	"
	18		"	"	"	"	"	"	"
	18		"	"	"	"	"	"	"
	18		"	"	"	"	"	"	"
	18		"	"	"	"	"	"	"
21	18	White	"	"	"	"	"	"	"
	18		"	"	"	"	"	"	"
	18		"	"	"	"	"	"	"
	18		"	"	"	"	"	"	"
	18		"	"	"	"	"	"	"
	21	Negroid	"	"	"	"	"	"	"
	21		"	"	"	"	"	"	"
	21		"	"	"	"	"	"	"
	21		"	"	"	"	"	"	"
	21		"	"	"	"	"	"	"
25	22	Negroid	"	"	"	"	"	"	"
	22		"	"	"	"	"	"	"
	22		"	"	"	"	"	"	"
	22		"	"	"	"	"	"	"
	22		"	"	"	"	"	"	"
	25	Negroid	"	"	"	"	"	"	"
	25		"	"	"	"	"	"	"
	25		"	"	"	"	"	"	"
	25		"	"	"	"	"	"	"
	25		"	"	"	"	"	"	"

*Unless otherwise stated, the types were "relatively pure Eskimo".

†Operation scars in the neck.

remainder can only be regarded as "relatively pure Eskimos".

Teeth missing.—The total number of teeth missing in each mouth is indicated: "none" missing clearly signifies that all the teeth were present. Not knowing the eruption periods of the permanent teeth in the Eskimo, it was only possible under the conditions of examination of girls and boys to note vacant spaces in the dentures.

Dental caries.—The number of decayed teeth per mouth is shown; "nil" is intended to mean that no teeth were decayed.

Pyorrhœa.—If pressure from a spatula upon the gum margin against the teeth caused the welling up of yellow secretion, the person was said to have pyorrhœa. The extent of the affection and the quantity of the discharge were graded together from plus to four plus.

Sordes.—By this term is meant that collection of general filth, consisting of epithelial matter, food, and microorganisms, heaped up upon the teeth at the gum margins, which is commonly seen in white man in our public wards. It was quantitatively graded plus to four plus.

Tonsils.—The size of the visible portions of the tonsils was noted as follows. "Very small" indicates that a very little or no tonsillar tissue could be seen in the tonsillar fossæ; when the surfaces of the organs were approximately flush with the pillars of the fauces the tonsils were described as "enlarged"; when they bulged forwards well beyond the pillars, and were obviously not quiescent, they were called "greatly enlarged". No acute infections were seen. Neither were any cases met with exhibiting hypertrophy with patent crypts where one was able to express caseous material, except in one instance where although no caseous material could be found the tonsils were enlarged and ragged. This case was labelled "chronic tonsillitis".

Glands.—The anterior cervical glands at the angle of the jaw were examined in most cases. "Nil" indicates in the tables that none could be felt; "palpable" that they could just be felt; and "enlarged", that they were abnormally large.

Tongue.—The condition of the tongue was noted. If it was red, moist, and not indented

by the teeth, it was called clean; if white or furred it was described as "dirty".

The number of cases showing missing teeth (26), dental caries (9), and sordes (7), out of a total of 106 of all ages, is striking. Of the 16 cases of pyorrhœa, 9 were found in the 15 patients seen at Wolstenholme on the northern shores of Quebec in Hudson Strait, and only 7 in the remaining 91 examinations.

Although the author has no statistics of the condition of the mouths of civilized man as seen in our public wards to offer in comparison, it is felt that the above findings show far superior health and hygiene. The relative quiescence of the tonsils is noteworthy. It may be mentioned that these natives have very little immunity to respiratory infections.

Any attempt to understand underlying factors in the Arctic is confronted with serious obstacles. First and foremost is the inability of the patient to cooperate, owing to the language difficulty. Since there are very few

TABLE IV.
SUMMARY OF 106 CASES (IRRESPECTIVE OF AGE)

	Teeth missing		Dental caries		Pyorrhœa		Sordes		Enlarged tonsils (105 cases)	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Number of cases.	11	15	3	6	15	1	6	1	2	3
Total number of cases.	26		9		16		7		5	

white men in our Eastern Arctic who can speak Eskimo sufficiently well to obtain accurate information the questioning of the natives is almost futile. The question of diet leads to further trouble. Their food seemed to fall somewhere between the limits of (1) purely native diet, and (2) partly civilized diet, depending upon how much contact they make with civilization at the trading posts.

1. *Purely native diet* has consisted, as far back as the memory of whites and natives extends, of seal, walrus, caribou, fish, more rarely birds, eaten sometimes raw sometimes "cooked". Cooking consists in placing the food in a pot of water suspended over a seal oil lamp for four to six hours. The temperature of the water, however, remains so low that one's

finger may comfortably be placed in it, and, moreover, no odour of the food cooked comes off the pot.

2. *Partly civilized diet.*—Whilst about the trading posts the Eskimo has access to civilized foods, particularly flour and sugar, which he adds to his native diet. The impossibility of ascertaining under present conditions the contact made with civilization, and therefore to what extent carbohydrates have entered into an individual's diet is at once apparent.

It is beyond the scope of this paper to discuss the factors responsible for the excellent condition of these native mouths. The author may however perhaps be permitted to say that his impression is that over all the average Eskimo's food consists almost exclusively of meat and very little carbohydrate, and, further, that he is forced by the nature of his food really to use his teeth.

Thanks are due to Major D. L. McKeand, Dr. L. D. Livingstone, and members of the Hudson's Bay Company for their courtesy and assistance.

Therapeutics and Pharmacology

SOME BRIEF NOTES ON DYSMENORRHOEA

BY W. DEAN MACDONALD

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By dysmenorrhœa we mean, in this very brief discussion, any discomfort appearing at the time of the menstrual flow that is absent between the periods, and not caused by active disease, such as endometriosis, inflammations, malplacements or tumours, whose treatment is surgical. Dysmenorrhœa has to be considered as a symptom and always treated as such. It should also be considered as more serious than is usually the case, and a correct diagnosis must be made.

What is the cause of this particular patient's pain? If this is not known it cannot be treated intelligently, or satisfactorily. The importance of hysteria, neuroses, personal idiosyncrasy, hypersensitiveness, mentality, constitutional disturbances, etc. must be evaluated. This is often the most important single factor in treating the majority of women with functional dysmenorrhœa.

Treatment is based on general measures. A daily warm bath at night the week preceding and *during the period* is a great help. This is better if followed by heat in bed, and the bowels kept open by mild laxatives. Physical exercises are, it is generally agreed by authorities, of the utmost help by correcting faulty postures and increasing muscle tone. It has long been known that girl athletes in good condition, living an out-of-door life, suffer much less than socially inclined persons. Many cases will respond to these measures, but some will not. For these it is well to remember the following points. Alcohol and opium should never be given. It has recently been shown that some patients with low fasting blood sugars, or a low sugar-tolerance curve, and even some with normal estimations, receive from partial to complete relief by in-

creasing their carbohydrate intake, beginning 2 or 3 days before the expected date of the period. Twenty-five c.c. of 50 per cent glucose in the vein during the severe pains has given immediate relief. Bromides between and during the periods do help nervous cases. In very severe cases where the pain is colicky and crampy, present since the first period, begins with the flow and lasts 8 to 24 hours, a good prescription to remember is: atropine 1-200 gr.; luminal 1-2 gr.; ext. hyoscyamus 1 gr.; pyramidon 5 gr. in a capsule three times a day, beginning 2 days before the period. The case that is most likely to give good results by dilating the cervical canal or incising the internal os is the one that responds to the above capsule with atropine, and even this form will return sometimes in 6 to 24 months.

Endocrine therapy is too young and too controversial a subject to be dealt with here, but a few points are worth mentioning. Some patients will be helped by a reliable preparation of corpus luteum extract. If there is genital hypoplasia theelin or some other follicular hormone should be added in proper doses. Should the case be one of pituitary deficiency it must be treated as such, or if a hypo-öphorism it must be treated for that and the dysmenorrhœa will often clear up as the whole case improves. If the dysmenorrhœa is associated with excessive bleeding ovarian therapy is contraindicated.

Small doses of thyroid very often help, even if the basal metabolic rate is normal, particularly if there are any signs or symptoms of deficient thyroid secretion.

Emmenin in 1 to 2 drachm doses in water, taken slowly throughout the day, starting 48 to 72 hours before the period, will give good results in a large percentage of cases.

There is a *fatigue dysmenorrhœa*; for this rest is imperative.

Nasal disease will often give pain at the menstrual period. The correction of this will some-

times give complete relief, and a thorough nasal examination is indicated in any unrelieved and persistent dysmenorrhœa. A procedure too seldom tried is treating the "genital spots" in the nose. These are located at the lower and anterior end of the inferior turbinates and the adjacent portion of the septum, the tuberculum. They can often be seen as swollen, red, and tender areas at the period. If the pain can be controlled by the application of 20 per cent cocaine to these spots in each nostril (by a competent rhinologist) then cauterization of the spots is indicated for more permanent relief which may last for years. The cases for this treatment are those in which the pain persists long after the flow has started.

AN AID IN HEARTBURN AND THE VOMITING OF PREGNANCY

By A. E. MOWRY

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The use of dilute hydrochloric acid in pregnancy is by no means new. This preparation has been used with varied success for years by many practitioners.

There are two main indications for its use in treating the parturient: (1) nausea and vomiting, and (2) heartburn.

It has been shown by analysis that there is a decrease of the acid gastric juice during preg-

nancy.¹ This occurs in a large percentage of cases. It has also been shown that a considerable proportion of sufferers with distressing symptoms will respond to dilute hydrochloric acid.^{1, 2} To keep the treatment standard, we have been using the dilute acid in 15 minim doses. This is administered in a large glass of water, and the patient is instructed to sip it with her meals.

The beneficial results obtained by the majority of patients with nausea or vomiting of pregnancy are definitely established. For these complaints the patient is also instructed to eat frequent small meals. In some cases a barbiturate is prescribed as well. The majority of these patients state that they feel the drops are beneficial. They are known to give relief in a few hours, but sometimes take several days.

Heartburn during pregnancy generally occurs in the later months. The same treatment with the drops is used. It has been noticed that patients with this symptom usually have it following the evening meal or at bedtime. As a rule the improvement is rapid.

It is willingly admitted that this form of treatment is not a panacea for heartburn and vomiting. However, the high percentage of success found in a series of cases to be published shortly forces one to conclude that this simple treatment is efficacious and a fairly consistent aid in these annoying complaints of pregnancy.

1. *J. Obst. & Gyn. of Brit. Emp.*, 1935, **42**: 1.
2. *Am. J. Obst. & Gyn.*, 1930, **20**: 382.

Case Reports

SCARLET FEVER MASTOIDITIS, WITH SINUS THROMBOSIS, AND JUGULAR LIGATION*

By G. EDWARD TREMBLE

Montreal

The following case was thought to be of sufficient interest to warrant publication because of the difficulties of diagnosis, the operative findings, and the ultimate result.

Peter J., aged five years, developed an acute suppurative otitis media on the right side following a cold. Paracentesis was done on June 15, 1935. The ear discharged profusely for two weeks and then stopped suddenly. The patient began running a late afternoon and evening fever, and it was deemed advisable to make a larger incision in the drum for freer drainage. Shortly after the second paracentesis a rash appeared, which was diagnosed as scarlet fever by the attending pediatrician. As a result the child was isolated at home. The ear was syringed every four hours and alcohol drops

were instilled, but the discharge continued to run freely rather than subside. Toward the end of July, that is, five weeks after the ear was first opened, the patient complained of a headache in the right temporal region, his temperature ranging from 101 to 102° F. in the afternoon and evening. Instead of the ear quieting down, granulation tissue appeared at the junction of the drum with the roof of the canal. In the presence of mastoid tenderness over the antrum and the tip, conservative treatment seemed useless and operative measures imperative. He was admitted to hospital August 8, 1935.

The family and personal history contained nothing of special note.

Operative findings.—The right mastoid was very extensive and found to be filled with pus and granulations, due to the long duration of the infection. The mastoid cells were broken down, forming one large abscess cavity with numerous zygomatic cells. A large terminal cell was found, so the whole tip was removed. The lateral sinus and middle fossa were not exposed. Plain packing gauze was inserted, enclosed in rubber tissue, and the wound was left open. Immediately following the operation the temperature dropped to normal, and the patient was discharged from the hospital within a week.

The wound partially healed and then appeared to become indolent. One month after returning home both the canal and the post-auricular wound were still discharging pus and this had become definitely odorous. The child had little inclination for food, owing to nausea.

* This case was presented before the Oto-laryngological Section of the Medico-Chirurgical Society in Montreal on three occasions in the past year and a half.

A definite fullness was noted on the side of the head above the right ear, which developed into a swelling, giving a marked asymmetry of the face,—causing pain on opening the jaw. In view of these symptoms and the fact that he "was sick at his stomach" it was decided to have the child admitted to the Alexandra Hospital and again explore the mastoid. This was done on September 25th.

On admission the physical and neurological examinations were negative except for a white cell count of 10,000. The mastoid wound was re-opened with the assistance of Dr. D. H. Ballon and all the granulation tissue removed. After exploring the cavity carefully, a pair of blunt-pointed forceps was inserted under the temporal muscle as it appeared to be ballooned up. A gush of thick yellow pus came away, estimated at about half an ounce. This proved on culture to contain *S. hæmolyticus*. In view of this finding it was thought there was sufficient to account for the symptoms, so the lateral sinus and middle fossa were not uncovered. For a few days the fever seemed to be subsiding, but on the fifth day the temperature went up to 106.2°. Early the same evening Dr. R. R. Struthers, the attending pædiatrist, made the following note. "There is a marked loss of weight and colour in the past week. Heart and lungs clear. Enlarged bean-sized gland below the right mastoid which is not tender. Mouth and throat clear. Reflexes normally active. No neck rigidity—no Kernig. Pupils equal and react to light. The spleen is enlarged on percussion upwards and is readily palpable—descends one and one-half fingers' breadths below the costal margin and is soft and smooth. Liver not felt. Abdomen otherwise negative. There is no purpura. Blood culture advised. Repeat W.B.C."

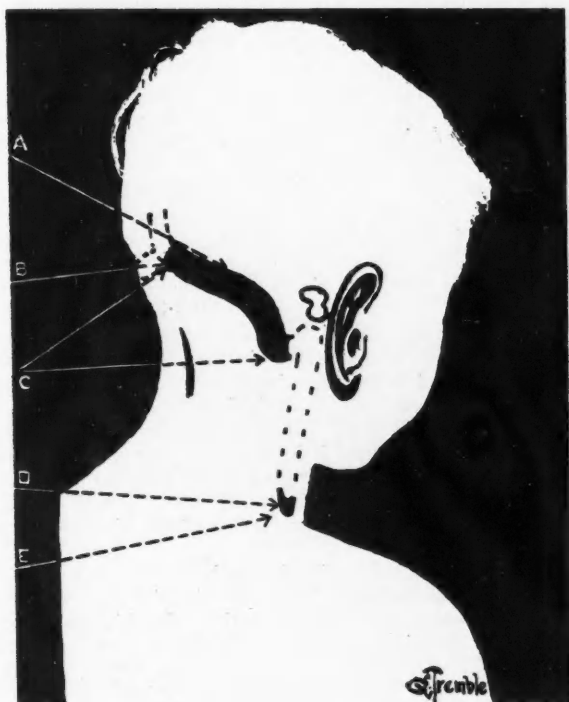


Fig. 1

- A. Lateral sinus opened and free bleeding obtained after ligating the jugular vein October 1st.
- B. Free bleeding at torcular October 13th.
- C. Whole of lateral sinus closed by a thrombus from the jugular bulb to the torcular Herophili October 13th.
- D. Clot removed from jugular bulb by suction October 13th.
- E. Internal jugular vein ligated October 1st.

Three hours later, Dr. W. V. Cone reported in summary: "No evidence of central nervous system involvement. Differential diagnosis, it would seem to me, lies between brain invasion, meningitis and sinus thrombosis. The first two are ruled out by examination. Impression—sinus thrombophlebitis."

In view of this examination and the fact that the white blood count jumped from 14,000 to 17,950 the same day, the child was taken to the operating room and the jugular vein on the right side ligated. The mastoid wound was explored and the lateral sinus itself appeared healthy with active pulsations; the vein was incised and free bleeding occurred without any evidence of clot. Plain packing gauze was inserted and the child returned to the ward. A few hours later a transfusion of 250 c.c. of citrated blood was given on the suggestion of Dr. Struthers. Two days after the operation (October 3rd) a pleuropericardial friction rub was heard. It was also mentioned in the bedside notes that the blood culture taken at the time of the operation showed no growth.

The child continued to run a septic type of temperature, with a beginning enlargement of the spleen, in spite of repeated transfusions. Although the mastoid wound seemed to granulate well and the jugular incision healed readily the boy's general condition did not improve. On October 10th a slight stiffness of the neck appeared and also a definite blowing systolic murmur. Dr. Cone examined him again on this date, and found that there was as much pain on rotating the head as when the chin was flexed on the chest. He noted that the boy was bright and cooperative, the central nervous system was normal, and he did not feel that meningitis was present. Dr. H. B. Cushing was asked to see the patient, but his examination failed to disclose any abnormality except that due to the local condition in the ear. In view of all the findings, the diagnosis seemed narrowed down to a lateral sinus thrombosis with jugular bulb involvement or septicæmia. As repeated blood cultures proved negative it was decided to explore the lateral sinus again.

On October 13, 1935, the child was again taken to the operating room and the mastoid wound re-opened. The lateral sinus was exposed and the absence of pulsations noted. As the wall of the lateral sinus appeared thickened and discoloured an incision a quarter of an inch long was made without free bleeding. On pressure, small pieces of organized clot were expressed. The whole length of the lateral sinus was uncovered from the jugular bulb to the torcular Herophili and found to be filled with a liver-coloured clot. (This had formed in the previous twelve days, because the sinus had been opened less than two weeks previously, when active bleeding took place.) On approaching the torcular there was a slight oozing, evidently from the lateral sinus of the other side and also from the straight and longitudinal sinuses. A large Eustachian catheter was connected to the suction pump and the remaining clot removed from the torcular. After free bleeding occurred the upper part of the wound was packed tightly and suction applied to the jugular bulb. A long clot was drawn into the suction bottle which evidently extended down to the ligature. This lower part of the wound was irrigated with hot normal saline and plain packing gauze lightly inserted. The child was returned to the ward and 200 c.c. of blood given intravenously. On the day after the operation there was a sudden drop in temperature from 105°, followed by a definite chill, which lasted six minutes. For the next few days, as the chills continued, Dr. Struthers ordered repeated blood transfusions, although the blood cultures showed no growth. At first the mastoid wound was dressed every day, and then every second day, as the enlarged spleen disappeared below the costal margin and the wound began to granulate. On the suggestion of Prof. E. G. D. Murray, the wound was irrigated with acriflavine, 1 in 1,000 in 2.5 per cent saline. After mopping this out a

mixture of fresh human serum and streptococcal antitoxin (scarlatinal) was instilled. Plain packing gauze was then inserted, soaked in acriflavine. Although this dressing appeared to hinder the formation of granulation tissue the wound healed up entirely in two and a half months.

Following the last operation the child became very irritable and resented attention of any kind. His convalescence was not entirely uneventful, as pain and tenderness developed over the great trochanter and then later in the right groin. This caused a neuritis of the sciatic nerve which remained troublesome for some weeks. On October 29th the boy complained of a sharp pain over the lower part of the right side of the chest on respiration and signs were found of a pulmonary infarct.

In spite of these complications, the child's general condition continued to improve. He was finally discharged from the hospital on November 13, 1935, with the note, "patient is weak but is progressing favourably".

The boy was given nine blood transfusions during his stay in the hospital, averaging 200 c.c. each time. It was thought that a plastic operation at a later date would be necessary to remove the scar, the incision having extended from the mastoid tip to the torcular Herophili. However, nothing further was done and today he is normal in every way.

OTITIC SEPTICÆMIA IN A DIABETIC*

BY R. SCOTT-MONCRIEFF, B.A., M.D. AND
JOHN T. MACLEAN, M.D.

Montreal

The case history of this child is of interest in being an example of the fact that it is possible to control seemingly overwhelming infection in a severe diabetic. Our diagnosis in the case was diabetes mellitus, with acute right frontal sinusitis; acute exacerbation of a chronic right suppurative otitis media, with mastoiditis; lateral right sinus thrombosis; and septicæmia (*S. beta-hæmolyticus*).

CASE HISTORY

H.E., male, aged 16, was a diabetic of five years' standing and had been admitted to the Royal Victoria Hospital several times previously for the control of his disease. His mother was an intelligent woman who had managed his condition very satisfactorily through many minor infections. Eight years before this admission, and again two years prior to admission, he had had an acute right suppurative otitis media.

On September 26th the patient was admitted to the Royal Victoria Hospital, and gave the following history.

Ten days before he had developed an acute rhinitis, after which the chief complaint was headache, mostly in the right frontal region. He complained at intervals

also of right-sided earache, and reported that there had been some thin discharge from the ear about three days after the onset of the rhinitis.

Physical examination.—Acutely ill; slight general under-development; photophobia. Temperature 103°; pulse 138; respirations 26.

Ears.—Right drum thickened and red, especially in the region of the membrana flaccida and alongside the handle of the malleus; slight fullness. Quite severe tenderness of the right mastoid, particularly over the antrum, and slightly over the posterior part of the process.

Nose.—Thick pus in the right middle meatus. Tenderness over the floor of the right frontal sinus. Throat.—Thick pus coming from the nasopharynx. Generalized congestion. Glands enlarged at the angles of the jaw and in the axillæ.

Heart and lungs.—Normal. Abdomen.—Liver edge palpable three fingers' breadth below the right costal margin. Spleen not palpated. Nervous system.—Considerable photophobia. The reflexes were all normal.

Laboratory findings.—Urine: albumin plus, sugar 2 plus, microscopically, negative. Blood sugar, 441 mg. per cent on admission. Blood count: Hgb., 79 per cent; red blood cells, 4,500,000; white blood cells, 19,400. The blood Wassermann test was negative.

Progress.—September 26th.—Myringotomy, right. Culture from the ear gave a pure growth of *S. beta-hæmolyticus*. Two days after the operation earache was absent. There was thin, yellowish pus from the ear and slight mastoid tenderness on the right side. Frontal sinus tenderness was almost absent. The nose was much clearer. Photophobia was absent and the temperature was normal. His condition remained thus for two days.

October 1st.—His temperature went up to 104°. The next day he had a severe chill; temperature 104°; blood culture negative. Insulin was given, 130 units per day. The following day he had another chill; temperature 104° and becoming swinging. Nose clear. The ear appeared much the same. There was still slight tenderness of the mastoid over the antrum and over the posterior part of the process. No other positive findings.

October 3rd.—Operation.—Simple mastoidectomy, right, with ligation of the jugular vein under ether. The mastoid was sclerotic and the cells were few and small, including the antrum which was situated deeply and decidedly high for the age. Granulations and pus were found in the antrum and the cells extending toward the tip. The lateral sinus was exposed, looked grey and thickened. The internal jugular vein was normal and was ligated below the junction of the facial vein. The lateral sinus was then incised but no thrombus could be demonstrated. Bleeding was controlled by external pressure with iodoform packing gauze. The temperature remained swinging. On October 4th, 5th and 6th, it reached a maximum of 105°, but thereafter gradually decreased until, on October 14th, the maximum was 101.3°.

October 10th.—Blood culture showed a scant growth of *S. beta-hæmolyticus*. This was the first of repeated blood cultures to be found positive, the highest count being 100 colonies per c.c. on October 18th. From October 15th to 23rd the temperature again became swinging, with a daily maximum up to 105° and minimum as low as 95°, but no chills. Blood culture on October 18th showed a profuse growth (100 colonies per c.c.) of *S. beta-hæmolyticus*.

October 20th.—Heart enlarged; gallop rhythm present and numerous extrasystoles. A rough systolic and a soft diastolic murmur were heard at the apex. October 21st.—The mastoid wound had been treated daily since October 3rd with acriflavine, 1:750 solution, poured into the cavity and left there for ten minutes. It was then sponged and a mixture of equal parts of human blood serum and scarlet fever antitoxin was poured on and left there. The wound was then lightly filled

* From the Royal Victoria Hospital, Montreal.
Submitted for publication September 9, 1937.

with gauze soaked in acriflavine 1:750 in 2.5 per cent saline solution. By now it was nicely filled in with healthy granulations and the drum was well healed.

October 23.—Exploration of the mastoid wound; incision of the lateral sinus. The sinus was uncovered for about two inches back from the bend, and pus was found between the tables of the skull near the posterior limit of the bony excavation. A mural thrombus was found at the site of the previous incision and was removed by suction. There was free bleeding from both ends. The anæsthetic used was gas and oxygen with, locally, 1 per cent novocaine.

October 25th.—Blood culture showed 3 colonies per c.c., but it was found that the patient's immunity was such that the organism (*S. beta-hæmolyticus*) would not survive in the patient's clotted blood.

November 6th.—The first negative blood culture was obtained on this date. Three blood cultures taken at later dates were also negative. There was a steady trend of temperature towards a lower level and a general improvement in the patient's condition, although the mastoid wound granulated very slowly.

November 9th.—Incision of an abscess on the right side of the neck. The abscess was deeply situated beneath the central part of the neck wound. It had a thick capsule. About one dram of pus was evacuated and *S. beta-hæmolyticus* was grown from it in pure culture. Following this, recovery was uneventful.

December 12th.—Local condition on discharge.—The ear-drum was normal except for slight diffuse thickening. Hearing tests showed the auditory acuity to be almost normal, and approximately equal in the two ears. The mastoid and neck wounds were well healed.

TREATMENT

Diabetes control.—We feel very definitely that any infection in a diabetic should be treated as an emergency: that the blood sugar should be brought to a normal level immediately and maintained at that level as nearly as possible. As is well known, the diabetic who harbours infection demands an unusually high amount of insulin for control. This patient's normal requirement on a diet of protein 75 g., fat 90 g., carbohydrate 200 g., was 90 units per day. During the acute infection, on a diet of protein 60 g., fat 50 g. and carbohydrate 140 g., he required 130 units per day. The diet and the insulin were adjusted daily after the amount of sugar in the previous twenty-four hour specimen of urine had been estimated. Frequent blood sugars were taken to ensure control. The patient was discharged controlled on a diet of protein 80 g., fat 70 g. and carbohydrate 225 g., with insulin 8-8-20-20.

The wound was treated daily with acriflavine 1:750 solution poured into the wound and left for ten minutes. It was then sponged and a mixture of equal parts of human blood serum and scarlet fever antitoxin was then poured in and left there. The wound was then lightly filled with gauze, soaked in acriflavine 1:750 in 2.5 per cent saline solution.

Scarlet fever antitoxin, 20 c.c. intramuscularly, when the blood culture became positive.

Formolized vaccine prepared from the *S. beta-hæmolyticus* grown from the blood stream. A subcutaneous injection was given every third day from October 28th to November 25th, the first dose being 0.15 c.c. and the maximum dose being 0.5 c.c.

Repeated small blood transfusions of 150 to 200 c.c. of blood were given every second day from October 5th to November 1st. These were started even before the first positive blood culture was obtained.

SUMMARY AND CONCLUSIONS

This patient presented a very interesting problem, for not only did he have a rapidly progressing mastoiditis which very soon spread

to involvement of the lateral sinus and to a streptococcal septicæmia but he was also a severe diabetic. As regards treatment, the two essential features were the control of the diabetes and the prompt, and perhaps drastic, operative procedures. It is interesting to note that the blood cultures rapidly became strongly positive, so that within a week of the first positive culture 100 colonies per c.c. were grown from the blood. Roughly a week later, the last positive culture was obtained, at which time the patient's immunity was such that the organism could not survive in his clotted blood.

Since so many different forms of treatment were used, it is impossible to assess the relative merits of each. But we do feel that the value of repeated small blood transfusions in the treatment of such types of infection should receive special emphasis.

We are indebted to Professor E. G. D. Murray for his kind assistance in the management of this case, and to Drs. E. H. Mason and Walter de M. Scriber, who have been supervising this boy's diabetic management during the past five years.

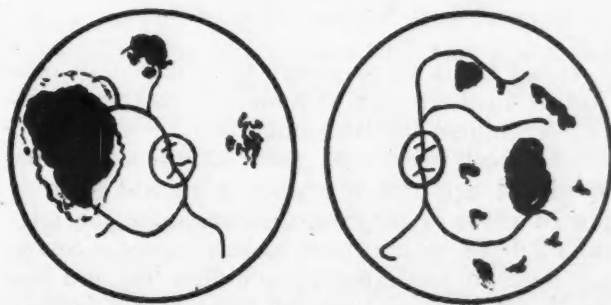
CENTRAL RETINOCHOROIDITIS IN CONGENITAL SYPHILIS

By BENJ. H. HARRY, M.D.

Oculist to British Columbia Mental Hospitals,
Vancouver

According to the literature as expressed by the abstracts of the *American Journal of Ophthalmology*, the above mentioned condition is rather rare. The following case is submitted as it appears to fit into this category.

O.D. Ophthalmoscopic O.S.



The patient was a boy of 16 years who had been blind to a great extent for ten years. He had perception of moving objects only in the periphery of each field; central vision was totally absent. Hutchison's teeth were present. The frontal bones showed marked bossing; speech was very defective, and there was spasticity of the right leg. His Wassermann test was plus four, and his mentality had been arrested since

infancy. He gave a history of some form of meningeal reaction at the age of six weeks.

Right eye-ground.—The disc was of a chalky whiteness, with the disc arteries absent. At 12 o'clock there was a patch of choroiditis with spots of pigmentation. There was another such patch at 2 o'clock. The main lesion was a large charcoal-coloured patch measuring horizontally three disc diameters and vertically about

four disc diameters. It was irregular in contour and bordered by a zone of sclerotic tissue.

Left eye-ground.—The pathological appearance here is essentially the same, with the exception that the central and main patch extends from the macular area downwards, and the general fundus shows a more general and finer deposits of pigment with more obscuration of the choroidal details.

Clinical and Laboratory Notes

REPAIR OF SECONDARY TRAUMATIC DEFECTS IN LIP MUCOUS MEMBRANE

BY STUART GORDON

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Misplaced portions of lip mucous membrane, the result of lacerations or operations, are not uncommon, and offer a rather troublesome little problem in treatment. The disfigurement resulting from this apparent redundancy of lip mucous membrane is often marked, and always obvious. Reconstruction is difficult, the problem being to remove just enough mucous membrane to eliminate the defect. Removal of more than necessary lessens the fullness of the lip. This produces an ugly disfigurement. Insufficient removal, on the other hand, leaves some modicum of the original deformity and pleases neither surgeon nor patient, and another excision is necessary to complete the repair.

carried out on the opposite side of the original snap. A fairly accurate judgment can now be made as to whether or not sufficient tissue has been marked out for excision. The tendency is to take too little rather than too much. If an insufficient amount is thus marked out the snaps are loosened and reapplied to include more tissue. Finally, the first snap is loosened and applied to include the full depth. Once it is decided that the correct amount has been defined, the mucous membrane is removed with scissors, the line of division being at the points of the snaps. The line of division should, as far as possible, be placed on the back of the lip and thus hidden. The mucous membrane edges are approximated with interrupted fine catgut sutures.

It is important that nerve block anaesthesia be used. Infiltration of the area with the anaesthetizing solution makes the problem of adequate removal difficult — practically impossible — and

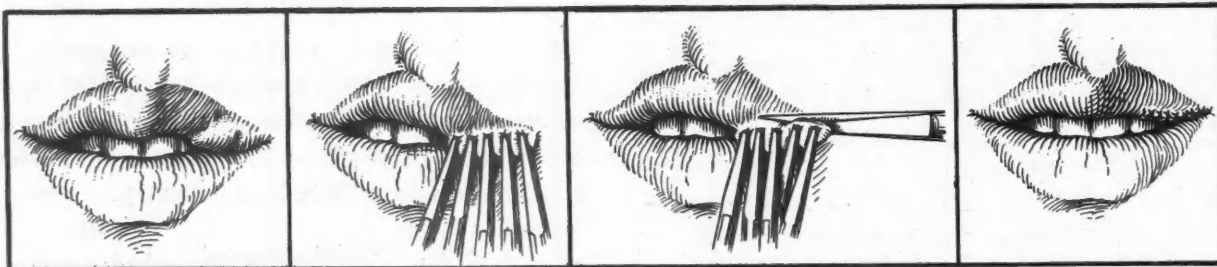


Fig. 1

Fig. 2

Fig. 3

Fig. 4

In an effort to overcome the element of conjecture in the repair of these defects the following technique has been adopted.

The most prominent point of the deformity is picked up with a snap. A second snap is placed close to the first, but includes the estimated depth of the tissue to be removed. Snaps are then put on in order, including less and less depth of tissue as they get farther and farther from the first one. The same procedure is then

therefore should never be used in this type of case. Fortunately, an infra-orbital block is a simple procedure, and will allow surgical procedures to be done on the upper lip painlessly. If necessary a bilateral block can be done. For the lower lip a mental nerve block suffices.

This technique has proved satisfactory. Since its adoption no secondary operations have been required, and no residual deformities left to disappoint.

Editorial

INDICATIONS AND CONTRA-INDICATIONS FOR OPERATION IN CORONARY OCCLUSION

IN view of the fact that, under suitable circumstances and given a sufficiency of time, the heart has no inconsiderable power of developing new vascular anastomoses in cases where the coronary arteries are obstructed it becomes a matter of practical importance to enquire whether we can aid in this natural process of defense. This question can now be answered in the affirmative. It can be taken as settled, on the basis of experimental, clinical, and post-mortem evidence, that surgical measures have a place, even if but a limited place, in the treatment of coronary occlusion. The work of Beck, Tichy, and Feil,^{1,3} in the United States, and of O'Shaughnessy,² in England, is sufficient proof of the truth of this statement. The American authorities endeavour to provide for the formation of anastomoses by grafting pectoral muscle and vascularized fat from the mediastinum and subcutaneous tissues on the surface of the heart; experimentally, they have also used the great omentum. O'Shaughnessy uses a graft from the great omentum. In both types of operation the results have been good.

Feil and Beck³ report a series of 25 patients operated upon, of whom 13 were observed for periods of five months or longer. Of the twenty-five 16 were living at the time of their publication and 9 were dead. Eight of the deaths occurred within one week of operation. Beck's original operation has been considerably modified and the improvement in technique is reflected in his mortality statistics. It is important to note that while the mortality rate in the first 12 cases was 50 per cent in the last 13 it was reduced to 15.4 per cent;

in the case of the last 9 there was no mortality. O'Shaughnessy⁴ reports 6 cases in which he performed his operation of cardio-omentopexy. One patient died a week after from a cause unrelated to coronary disease—hæmorrhage from a duodenal ulcer; the others were apparently benefited. Neither series of cases is extensive but the results are encouraging.

Feil and Beck (*loc. cit.*) suggest three possibilities to explain the good effect of operation: (1) an actual increase in the supply of arterial blood to the myocardium; (2) a redistribution of the blood that passes through the coronary arteries owing to the establishment of new intercoronary communications; and (3) the interruption of nerve pathways from the heart. O'Shaughnessy is less detailed, but states that the graft fulfils the immediate function of supplementing the blood-supply to that portion of the myocardium still capable of activity, that it prevents further necrosis of any area so ischæmic as to have lost its active function, and that it should in some measure act as an insurance against any further obliteration of the coronary tree.

The indications and contra-indications for operative interference in coronary disease cannot as yet be rigidly defined. It is obvious, of course, that the results to be obtained will depend in a general way, first, on a judicious selection of the cases, and, secondly, on the nature of the operation performed. O'Shaughnessy (*loc. cit.*) demands unequivocal evidence of cardiac ischæmia, and must be satisfied that the immediate risks from the operation are less than the patient must in any event run if his disease pursued its natural course. Feil and Beck lay down the following criteria: (1) unequivocal evidence of coronary sclerosis; (2) inability to get along on medical treatment, drugs and rest, with any degree of comfort; and (3) absence of

1. BECK, C. S. AND TICHY, V. L.: The production of collateral circulation to the heart, *Am. Heart J.*, 1935, 10: 849 and 874.

2. O'SHAUGHNESSY, L.: Experimental methods of providing a collateral circulation to the heart, *Brit. J. Surg.*, 1936, 23: 665.

3. FEIL, H. AND BECK, C. S.: Treatment of coronary sclerosis by producing a new blood supply, *J. Am. M. Ass.*, 1937, 109: 1781.

4. O'SHAUGHNESSY, L.: Surgical treatment of cardiac ischæmia, *The Lancet*, 1937, 1: 185.

circulatory failure. Hypertension is not a contra-indication, nor is diabetes when properly controlled.

In the selection of suitable persons to undergo these operations one would naturally exclude those who would ordinarily be considered bad surgical risks. Yet, O'Shaughnessy remarks that at the Lambeth Cardio-vascular Clinic they have established that cardio-omentopexy can be performed without immediate disturbance even in a type of patient ill-suited to most surgical procedures, and Feil and Beck do not believe, even though the patients are bad risks for any operation, that the mortality in the future will be high for their operation on the heart. This seems to be a happy augury and speaks well for the judgment of these authorities in the selection of their cases and for their operative skill. Should it prove, with greater experience, that these operations are attended by a low mortality it may well be that the range of their applicability will be extended.

Patients suffering from coronary occlusion may be divided into four groups: (1) those who die instantly or within a very few hours from the initiation of the attack; (2) those who survive for the time-being, but succumb in a few days or weeks from heart failure; (3) those who have recurring attacks, but yet survive many months or years; and (4) those who never have a second attack. According to some authorities group three comprises almost 80 per cent of the cases. It is in this group that the operations of Beck and O'Shaughnessy find their field of usefulness. One may properly enquire, however, in view of the low mortality associated with them, whether Feil and Beck's second criterion, as given above, may be not unnecessarily severe. Perhaps it may eventually be found justifi-

able to operate in more cases of group three or the potential group three, that is, to operate as soon as it is evident that the patients have made a satisfactory recovery. Most of them are going to have other attacks later, which may prove fatal or seriously incapacitating, so why wait until the powers of recuperation are further handicapped? Early operation would seem preferable to late operation, and in the end would prove life-saving for a greater number of patients. O'Shaughnessy's second requirement, as given above, is more elastic, and, in our judgment, at least, would seem a better guide. With accumulated experience, no doubt the indications for operation will be more exactly apprehended. With regard to the type of operation to be adopted, time will also give a lead. Naturally, the simplest operation, that attended with the least shock, and that causing the least disruption of the tissues would seem the most desirable. O'Shaughnessy prefers his own operation of cardio-omentopexy for the reasons that he does not feel that the factors producing post-operative shock can be so well controlled in Beck's operation, and in his hands, at least, would be a more serious operation, and that the omentum has obvious advantages over muscle as a vascularizing agent. Both these authorities are at one, however, on the necessity of full co-operation between the physician, surgeon and the specialists in order to determine the suitability or otherwise of any given patient for treatment by surgical measures. For fuller details as to the selection of cases and the prognosis the reader is referred to a recent article by Davies, Mansell and O'Shaughnessy.⁵

A.G.N.

5. DAVIES, D. T., MANSELL, H. E. AND O'SHAUGHNESSY, L.: Surgical treatment of angina pectoris and allied conditions, *The Lancet*, 1938, 1: 1 and 76.

THE OSSIFICATION AND MATURATION OF BONE

OF all uninteresting anatomical facts perhaps the most burdensome are ossification dates. These dates have, however, many clinical as well as medico-legal applications, and generations of students therefore learned figures dogmatically stated, but derived from a few skeletons and subsequently proved erroneous (Todd¹). Now-

1. TODD, T. W.: The anatomical features of epiphyseal union, *Child Development*, 1930, 1: 186.

adays the statements, made with equal dogmatism, are commonly based on radiographs of living subjects with no apparent bone disease, and yet discrepancies, sometimes of several years, are found between these average dates and the results of observations by Professor Wingate Todd and his assistants at Western Reserve University (observations extending over fifteen years), involving a quarter of a

million radiographs on more than four thousand children with detailed health records, all the radiographic interpretations being based on the dissection and radiography of the bodies of four hundred children. In all respects the observations that underlie current textbook statements are unsatisfactory. For example, trivial illnesses affect ossification (Todd,¹ Harris²), and Todd³ has shown that in children in a good environment, especially with proper food, bony epiphyses unite with the shafts a year or more earlier than do the epiphyses of children in an average environment. Poor children lag still farther behind. Such facts, rather than racial differences, account for the differences between British and American observations.

Since nutrition is so influential, ossification dates can never be final or universal, but one thing is clear, that the badly established statements in anatomical and radiological books must be disregarded. It is not only simpler but more scientific to group ossification dates into broad age-periods—Fetal, Infantile, Puberty and Adolescence (Whitnall⁴). For details the best data are those of Todd,³ to which a further contribution is soon to be made (Todd).

Professor Todd's investigations go far beyond ossification dates—into the maturation of bone. It is a commonplace that a child may be tall but not correspondingly mature in body, and yet the fact that size does not indicate maturity seems to have been forgotten by workers who are still trying to measure maturation by the increase in area of epiphyses or carpal bones. The dates when ossification centres appear are not reliable indicators of maturation, because they depend on the availability of mineral matter, on the readiness of cartilage to ossify, and, therefore, on the supply of vitamin D.

Skeletal maturation is indicated by the progressive changes in shape and structure of bony epiphyses, carpals and tarsals; and later, when epiphyses are about to fuse with shafts, by the degree and mode of penetration of bone into cartilaginous epiphyseal plates. Standards have been selected typical of the stage reached every three months in the first year and every six months thereafter until epiphyseal union is complete. The sequence of stages is the same whether the child matures more, or less, quickly than did those who provided the standards. The method and standards have been previously described (see especially Todd³), and, after thorough testing on large groups, an atlas (Todd⁵) of very clear standard radiographs of male and female hands has been issued, with full descriptions and explanations, so that assessment of any adequately made radiograph presents little difficulty. Atlases of other epiphyseal regions are to follow.

That skeletal maturation is a valid indicator of physical maturation in general is perhaps best illustrated by reference to menstruation. Most girls menstruate first at one particular stage of skeletal maturation (Todd³), although their actual ages vary greatly.

These investigations have wide practical applications. All who are concerned with children's health must be interested in such questions as whether a certain undersized child is correspondingly physically immature, or whether another child's emotional or moral difficulties arise from his being more "grown up" physically than the average child of his age and experience. In treating delayed growth and development, for example by thyroid and pituitary substances (Zuck⁶), repeated observations of skeletal maturation are practically essential.

To one who has followed Professor Todd's work in detail it is regrettable to note how little it has been appreciated by British anatomists, and it is interesting to learn that in at least one Canadian medical school the anatomy department has continued to teach the information on ossification criticized above, while the department of paediatrics teaches along the lines laid down by

2. HARRIS, H. A.: *Bone Growth in Health and Disease*, Oxford University Press, 1933.

3. TODD, T. W.: *Growth and Development of the Skeleton*. White House Conference Report on Growth and Development of the Child, Pt. II.—Anatomy and Physiology, Century Co., New York, 1933.

4. WHITNALL, S. E.: *The Study of Anatomy*, Arnold, London, 1933. (The age-equivalents of the ossification periods referred to should be modified by reference to Professor Todd's statements.)

5. TODD, T. W.: *Atlas of Skeletal Maturation*, McAtinsh, Toronto, 1937.

6. ZUCK, T. T.: The measurement of aberrant developmental growth, *J. Pediat.*, 1933, 3: 424.

Professor Todd. One reason for this "time-lag" in anatomical teaching is undoubtedly the influence of the days when it was the anatomist's pride to "make dry bones live"—to clothe dead bones with muscles and other structures equally dead, instead of teaching that bones are intensely alive. Another reason for the neglect of Professor Todd's

work appears to be that such costly investigation must justify itself, and secure further financial support, by frequent popular or semi-popular reports with little detailed evidence, thus creating a misleading impression of its soundness. The newly published atlas leaves no room for such neglect or criticism.

DONALD MAINLAND.

Editorial Comments

The Qualifications of Laboratory Technicians

One of the difficulties faced by our hospitals and their staffs in the selection of laboratory technicians is the lack of an adequate yardstick for measuring their qualifications. Not that certain standards of qualification do not now exist, but such have not as yet been sufficiently utilized by either the would-be employers or the technicians to give them authoritative and widespread recognition. The situation is particularly difficult in the smaller centres, for such institutions frequently must pick their technicians from afar and have considerable difficulty in evaluating the capability of the applicants by correspondence.

At the present time there is a young Canadian organization which already has enrolled over 200 members. This is the incorporated Canadian Society for Laboratory Technologists, with headquarters in Hamilton, Ont. Members must have honour matriculation standing, have had at least one year of medical laboratory experience, and have satisfactorily passed an oral and written examination set by an examining board of clinical pathologists and members of the Society. Prior to January of this year admission was without examination and upon the recommendation of two pathologists.

For some years a number of technicians in Canada have been members of the Registry of Medical Technologists of the American Society of Clinical Pathologists, with headquarters in Denver, Col. Membership requirements in this body have been stiffened recently, it being essential to have had two years' college instruction with credits in chemistry, biology, bacteriology and physics, and to have had either twelve months' instruction in an approved training school for technicians or an apprenticeship for at least a year under a qualified clinical pathologist. Graduation from an accredited training school for nurses is not now taken as an equivalent for the college course. Registrants are known as Laboratory Technicians (L.T.), or, if a complete university training in medical technology or equivalent be obtained and the applicant be recognized for outstanding research

or other service, the title of Medical Technologist (M.T.) may be granted.

Unfortunately the majority of technicians are not as yet members of either body. Many have not had the educational background or training required, and a large number, including many who have proved very competent, have simply picked up their knowledge by the apprenticeship method. One primary reason may have been that, with a very few much appreciated exceptions, organized courses of instruction have not been developed by our hospital and other laboratories. Also we have no machinery at present for the approval of schools for laboratory technicians in Canada. Under such conditions many technicians are undertaking exacting scientific tests for which they are not adequately trained, and really well-trained technicians often find it difficult to obtain employment.

In an effort to develop some solution of this situation a special committee of the Canadian Medical Association under the Chairmanship of Dr. William Deadman, of Hamilton, has been giving thought to the advisability of encouraging the development of schools for technicians in selected laboratories, and of formulating standards for accrediting such departments, such as is now undertaken by the American Medical Association. The suggestion has been made also that there be set up in Canada a registry of qualified technicians, having in mind the varying requirements of large and small institutions. The recommendations of this committee will be awaited with interest.

HARVEY AGNEW

The Journal of Neurophysiology

We note the addition of a new journal to the long list of medical publications. This is entitled the *Journal of Neurophysiology*,* with an editorial board of Drs. J. G. D. de Barenne, J. F. Fulton and R. W. Gerard, and an extensive advisory board. The primary aim of this Journal is to provide a channel for prompt

* Published bimonthly by C. C. Thomas, Springfield, Ill.

publication of original work bearing on the functions of the nervous system. It will not however include morphology or neuropathology, and clinical, zoological or psychological contributions will only be considered when they are primarily experimental in character.

The format and printing are excellent. The articles are not long and the illustrations are adequate. The *Journal of Neurophysiology* should be of value in recording the most recent experimental work in this field. H.E.M.

The Cultural Reproduction of Chromidial Granules in Malignant Neoplasms

Attention is directed to an article by Dr. O. C. Gruner on the above subject which can be found on page 389 of this issue. This article deals with the important and absorbing subject of the presence of micro-parasitic organisms in cancer tissue, and brings out some new observations which form a link in the chain of evidence being welded at the present time. A.G.N.

Special Articles

DIET AND NUTRITION

PROTEIN REQUIREMENTS IN NORMAL NUTRITION*

By LENNOX G. BELL, M.D., M.R.C.P. (LOND.)

Winnipeg

II.

The protein requirement in the normal diet is a subject upon which a wide difference of opinion exists, and many of the ideas are so much at variance with the known facts that these requirements should be emphasized in any discussion of normal nutrition.

In prescribing normal diets the relative proportions of fat and carbohydrate may be varied within wide limits so long as the total caloric requirements are met. In the case of protein, however, the optimum requirements cannot be supplied so simply. Protein plays a fundamental rôle in the body. Primarily, it supplies the necessary amino-acids for growth and repair of tissues, and for the manufacture of certain secretions, antigens, hormones, antibodies, enzymes, etc. In the second place, protein may be used to furnish energy through its deamination and transformation to carbohydrate. A third and perhaps less important function of protein is concerned with the transport of fats and other lipoids in the body.

Proteins are nitrogenous compounds formed of a number of amino-acids which combine in several different ways to form a wide variety of proteins, both animal and vegetable. Some twenty-two amino-acids occur in varying amounts in animal and vegetable proteins. It has been established that whereas certain simple amino-acids like glycine and alanine can be synthesized in the body others must be supplied in

the diet if normal health and growth are to be maintained. There is experimental evidence to indicate that ten amino-acids cannot be synthesized by the higher vertebrates. Certain proteins such as lactalbumin of milk, beef protein, ovalbumin of eggs, glutenin of wheat, contain all the essential amino-acids, and since in the average mixed diet some or all these are supplied, only in the case of freak vegetable diets will actual qualitative deficiency arise.

The reserve or deposit protein amounts in the adult human body to approximately 2 kg. Though its fuel value is only 8,000 calories, about sufficient to maintain life at a basal level for five days, nevertheless, with its associated water (10 kg.), it forms a considerable part of the non-skeletal structure of the body. But, though available as reserve fuel in case of necessity, this protein probably serves the more important protective purpose of maintaining the stock of materials available to replace the wear and tear on vital organs such as the heart, thereby avoiding the destruction of less essential living protoplasm to protect them. It is associated with the state of turgor of tissues and, in general terms, with the sense of fitness of the body, with the power of resistance to infections, etc. In fever, starvation and wasting disease it falls to a low value, but is present in excess in myxoedematous states. It should be noted that in children not only is the reserve smaller but the rate of metabolism is higher, hence the more rapid wastage of the body as compared with adults when afflicted with the same disease.

When sufficient calories are otherwise provided muscle-activity has little effect on the protein requirement. Only when the calories are inadequate is protein called upon to supply the deficiency. During fasting most of the energy required for muscle work is derived from fat, only 3 per cent being obtained by breaking down protein. The notion, frequently encountered, that a high protein diet is essential for heavy work is fallacious, and, indeed, in temperate weather actually mischievous, since the

* This article is the second in a series on the Nutritional Requirements of the Normal Person. The series is being prepared by a number of authors acting in cooperation with the Committee on Nutrition of the Canadian Medical Association.—EDITOR.

The first article can be found in the *Journal*, 1938, 38: 277.

high specific dynamic action of the metabolizing protein causes conversion of considerable amounts of energy directly into unnecessary heat which must be dissipated. By contrast, the specific dynamic action of burning fat and carbohydrate is small. During exposure to cold weather the increased heat production induced by protein metabolism may be useful when the total energy requirement for work is small, but in the heavier outdoor occupations it is unnecessarily wasteful.

Every normal diet must include a certain quantity of proteins of sufficient variety to supply all the necessary amino-acids. Protein rich foods are enormously more expensive than carbohydrate foods; hence the economic factor enters into the question in planning normal diets. It is of considerable importance to know as accurately as possible what are the protein requirements of the normal diet. Carl Voit, in

1881, using the statistical method of studying normal diets, established the average protein intake as 118 grams daily. Professor Chittenden at Yale, in 1904, using as subjects active soldiers and athletes, was able to maintain nitrogenous equilibrium on diets containing 40 grams of protein. Today it is generally accepted that about 60 grams of protein, or, roughly, 1 gram per kilogram of body weight, represents an adequate protein intake, and 1.25 to 1.5 grams per kilogram is commonly used in middle-class dietaries. For growth and the higher rate of metabolism of children larger allowances must be made.

During the war many observations were made in Central Europe on large groups of people who were receiving insufficient food. Many cases of anæmia and hunger oedema due to lowering of the blood proteins were studied. Yet it was observed by Muller that the protein deficiency symptoms entirely disappeared if ade-

TABLE I.

Source of protein	Raw or cooked	Average serving	Protein in serving	Grade of protein	Fat	CHO	Calories in serving	Calories per pound
		oz.	gram		percentage	percentage		
Beef, roast	C	2½	17.0	A	28.0	..	257	1,512
boiled	C	3	22.5	A	23.0	..	276	1,380
corned	C	3	24.0	A	19.0	..	247	1,235
small sirloin	C	5	36.0	A	10.0	..	279	837
tongue	C	1½	8.5	A	23.0	..	127	1,270
Veal, roast leg	C	3	25.0	A	1.0	..	109	545
cutlet	C	4	24.0	A	7.0	..	171	641
Bacon, side	C	1½	6.8	A	40.0	..	189	1,890
back	C	1½	9.9	A	33.0	..	173	1,732
Ham	C	2	13.2	A	33.0	..	231	1,732
Pork, roast leg	C	2½	21.0	A	10.0	..	151	909
chop, lean	C	2½	20.0	A	6.0	..	119	711
Lamb, roast leg	C	2½	15.0	A	13.0	..	147	827
chop	C	2½	13.8	A	26.7	..	235	1,408
Chicken, roast	C	3	22.5	A	5.0	..	130	612
Turkey, roast	C	2½	20.9	A	18.4	..	210	1,295
Salmon, boiled	C	3+	19.6	A	7.5	..	146	680
Halibut, boiled	C	3+	21.4	A	4.0	..	120	540
Mackerel, boiled	C	3+	23.7	A	6.5	..	153	688
Trout, lake	C	3+	18.0	A	10.0	..	162	729
Oysters	R	3+	6.0	A	1.0	3.0	45	202
Eggs, two	R	3	12.0	A	6.0	..	156	780
Milk	R	10	9.0	A	4.0	5.0	204	306
Cream, table	R	5	4.0	A	16.0	3.8	255	850
whipping	R	5	3.0	A	32.0	3.8	451	1,503
Cheese, domestic	R	2/3	5.6	A	38.0	..	91	1,943
Ice cream	R	3+	5.2	A	10.0	18.0	189	850
Bread, wheat	C	2	5.4	B	1.0	55.0	160	1,192
rye and wheat	C	2	7.2	B	..	52.0	160	1,190
Oatmeal, boiled	C	3+	2.8	B	0.5	11.5	61	274
Shredded Wheat, one	C	1	3.0	B	0.4	75.0	109	1,744
Puffed rice	C	½	0.9	B	..	80.0	54	1,575
Cornflakes	C	2/3	1.1	C	1.5	81.0	72	1,640
Macaroni	C	3+	3.0	B	1.5	15.8	91	410
Peas, green	C	3	6.0	B	3.0	13.5	110	536
Beans, canned, baked	C	4	8.0	B	3.0	22.0	173	649
Corn, canned, green	C	3+	2.8	C	1.2	19.0	101	455
Calf's foot jelly	C	2	2.5	C	..	9.0	54	89
Jellied meats	C	3	13.0	AC	2.5	..	74	370
Meat and vegetable stew ..	C	5	7.5	AC	5.0	5.0	127	381

NOTE: + equals less than half an ounce, i.e.: 3+ equals 100 grams.

Grade A proteins, excellent replacement and growth value.

Grade B proteins, good supplementary protein.

Grade C proteins, incomplete: never to be used as the major protein of the dietary.

quate carbohydrate was added to the diet. These observations illustrate the protein-sparing action of carbohydrate, later confirmed experimentally, among others, by Rubner, who was able to maintain nitrogenous equilibrium on 33 grams of protein as long as the total calories equalled 2,000 daily. This protein-sparing action is not possessed by fats when fed alone, though fat and carbohydrate mixtures function fully as well as carbohydrate alone.

The problem of protein malnutrition is not encountered only during war and famine. Practitioners meet it daily among poor and ignorant people, and perhaps almost as frequently among the opinionated and ignorant followers of some dietary faddist or commercialized diet racketeer. Suffice it to say, then, that problems of protein nutrition will arise under conditions causing an insufficient intake or inadequate absorption of the protein or other foods, whenever the protein loss is abnormally large or there is reason to suspect that increased destruction of protein is taking place, or whenever the body is unable to replace the broken-down protein with sufficient speed.

It will be readily apparent that the protein intake for normal nutrition and growth will vary with the age of the individual as well as with his size. Holt and Fales suggest 4 grams of protein per kilogram body weight up to one year of age, the requirement diminishing gradually, until at six years 2.6 grams per kilogram body weight is sufficient. The requirement may be more simply expressed as that protein contained in 2 ounces of milk (1.8 grams protein) for the first year, and thereafter 1.5 ounces of milk for each pound of normal body weight. Indeed this standard might be accepted as providing sufficient protein up to twelve, even fifteen years of age, when the requirements for growth diminish. During adolescence 0.9 ounces of milk should be adequate and 0.8 ounces thereafter would provide liberal protein for the adult.

Milk, however, as a permanent diet has many obvious disadvantages which these calculations have for the moment ignored. It should furnish 100 per cent of the protein for the first four months of life and 90 per cent of the protein for the remainder of the first year. For the next seventeen years, 30 ounces of milk (27 grams protein) should be supplied, and thereafter a minimum of 10 ounces of milk daily is desirable. This includes the amounts used in cooking. The remaining protein may be obtained from other sources, but up to six years of age the diet should contain at least two-thirds of its protein in the form of Grade A protein (meat, eggs, fish, fowl and dairy products). Thereafter, from 35 to 50 per cent of the protein intake should be Grade A, the remainder being derived from as wide a variety of sources as possible.

From the Table it is simple to ascertain the approximate protein sufficiency of a diet. Thus one serving each of milk, eggs, and roast beef, with three servings of bread, contain 1,100 calories and 54 grams protein, four-fifths the protein requirement of the average man, and over 70 per cent of it is Grade A protein.

THE CULTURAL REPRODUCTION OF CHROMIDIAL GRANULES IN MALIGNANT NEOPLASMS*

By O. C. GRUNER, M.D.

Research Fellow, McGill University, Montreal

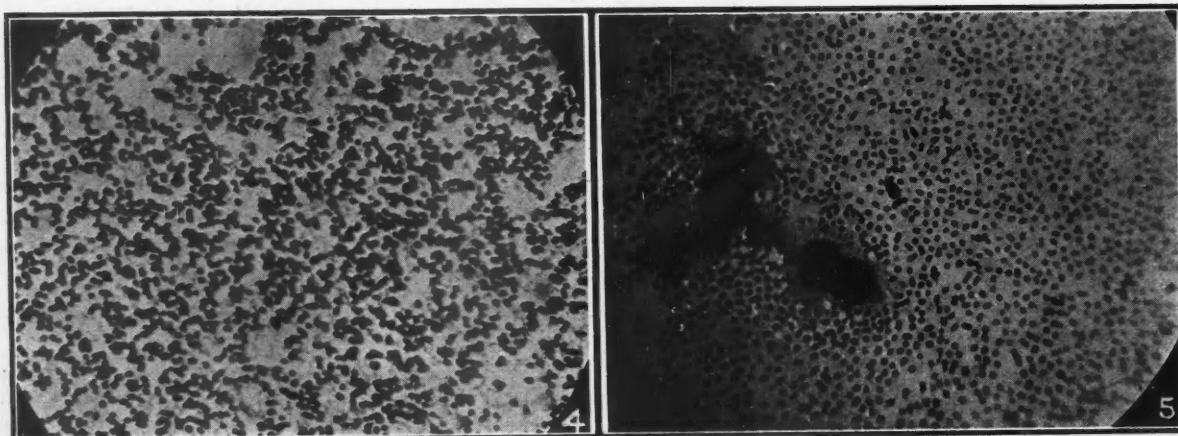
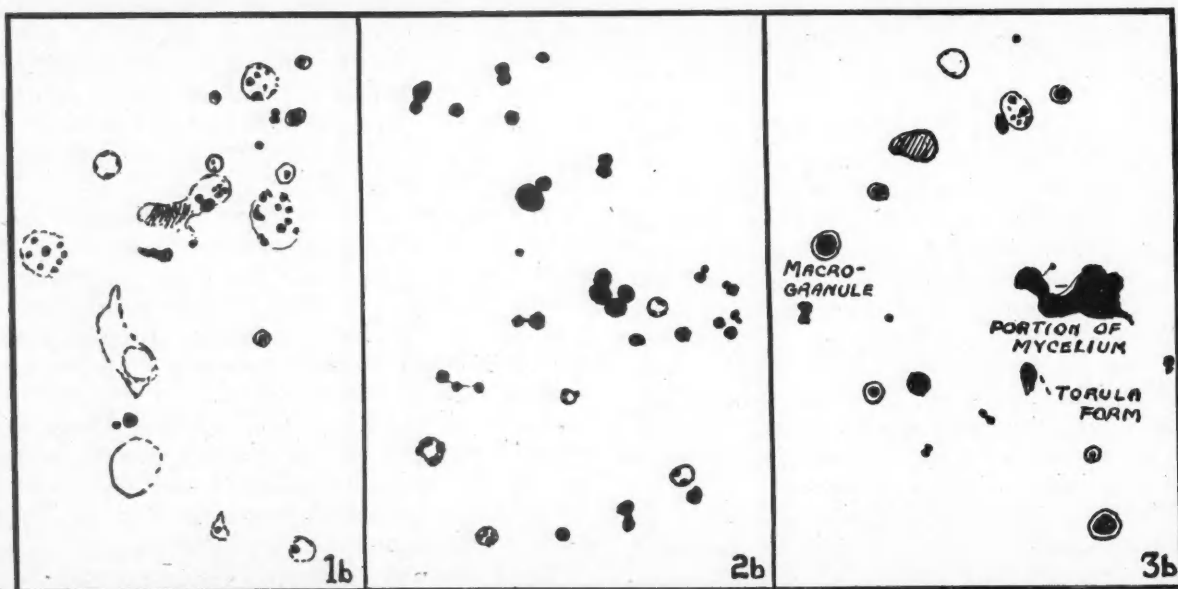
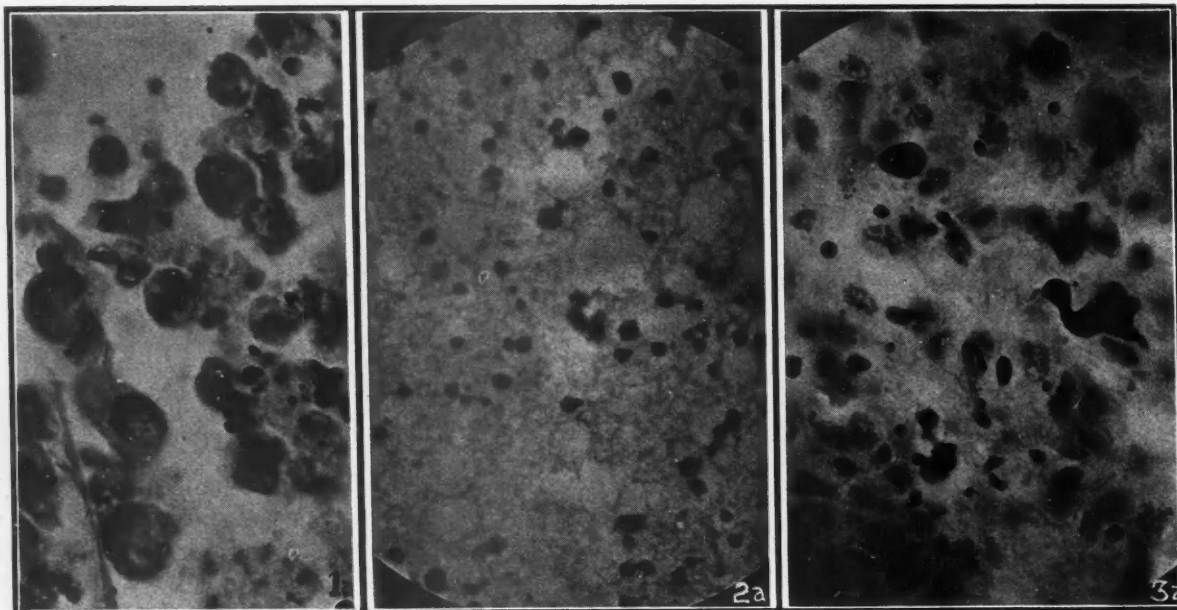
In a previous communication (*Canad. M. Ass. J.*, 1937, **36**: 31) a description was given of the various types of granulation met with in the tissues of sarcomas and carcinomas as providing a basis upon which the structure of neoplasms could be correlated with clinical phenomena. It was suggested that such granulations should be assigned a major place in the process of neoplasia. Critical evidence in favour of such a theory would be to hand if it were possible to obtain such bodies in culture in a cell-free medium, for then the usual view that they are simply degeneration-products of nuclear breakdown would be set aside.

The study of over-living carcinoma tissue fresh from the operating room, either by the dark-field method or by the Zeiss polychromar, shows granules varying in size from that of "elementary bodies" upwards. Blood-cultures and cultures from the tissue also show the most minute bodies, but usually fail to demonstrate those of the kind found in the (so-called) necrotic parts of tumour tissue as shown in Fig. 1a (oil immersion view of the lumen of an acinus in a human adenocarcinoma). Fig. 1b interprets which granules are referred to.

The accompanying photographs are from cultures in which multiplication of various kinds of these bodies has taken place. Fig. 2a shows those isolated, and multiplying in a 16-day old blood-culture on tomato-broth, taken from a case of carcinoma of the thyroid during the operation. The irregular shadowing of the larger bodies is barely visible in the photograph, for which reason a companion sketch is placed against it (Fig. 2b). The budding forms are however easily made out. This is stained as for elementary bodies (carbol-fuchsin).

Fig. 3a presents an oil-immersion view of a section from mouse-sarcoma (strain dbrB from

* This work was made possible by a grant from the Archibald Cancer Research Fund, McGill University. The paper was received for publication on February 12, 1938.



Bar Harbour) showing several types of granulation in one field. The largest irregular mass is fungoid in character. (Gram-positive; red with safranin). The unstained over-living tissue was choked with minute granules, which were also obtained in pure culture as shown in Figs. 4 and 5, the magnification being 1,800 diameters, so that the granules are much smaller than the usual micrococci.

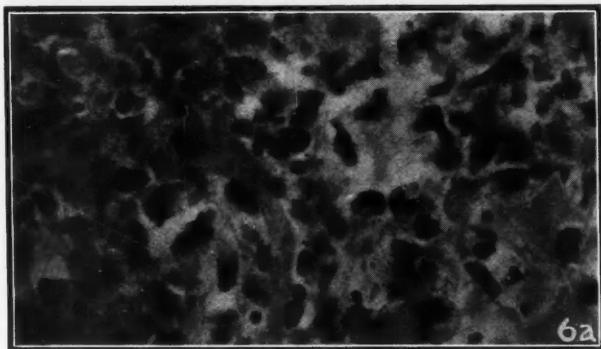


Fig. 6a

The view that chromidial granules are sometimes of exogenic origin (that is to say, are infective in nature) is also supported by the specimen shown in Fig. 6a, which shows a lesion in the liver of a rat which had been inoculated with a cryptomyces isolated from a case of human gastric carcinoma. Typical short fungal

hyphae are evident, besides the sharply defined round granules of various sizes. (Panchrom. stain; oil-immersion view). Budding forms are also numerous.

The different cultures show a pleomorphism recalling that emphasized in the cryptomyces originally reported.

To sum up, evidence is presented to show that the chromidial granules of various kinds which

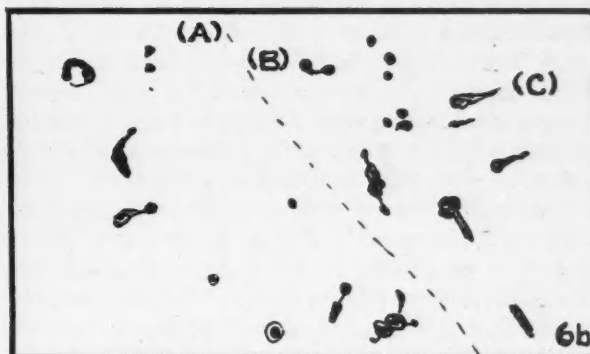


Fig. 6b.—A. edge of liver tissue; B. edge of lesion; C. fragments of hyphae.

form a feature of most malignant neoplasms, both in the necrotic and non-necrotic parts, are not all degenerative-products but are viable organisms possessing reproductive power. The part which such organisms play in the neoplastic process is another question.

Men and Books

THE EARLY DOCTORS OF SOUTHERN ALBERTA*

BY HEBER C. JAMIESON, M.B.

Edmonton

The settlement of Alberta was of so recent a date and took place in various districts under such particular circumstances that its early medical history can be sketched without difficulty. First fur traders in canoes, next missionaries in ox-carts, then the mounted police in the saddle, and later settlers by train played their part in opening up the country.

To the far north in 1776 came the intrepid trader, Peter Pond. Pushing his way beyond the trading posts on the prairie, he reached Lake Athabasca and established the first permanent settlement in the province, Fort Chipe-

wyan. This fort for over a hundred years was the main depot of the fur business for the vast northland. The second centre originated on the North Saskatchewan. Fort Edmonton was built in 1795 to capture the trade from the Rocky Mountains. For nearly three-quarters of a century only the northern and central portions of the province were occupied by the few white men engaged in barter with the Indians.

In 1873 American fur traders, having invaded Alberta from Montana, were becoming a menace to the country by their unfair methods of bargaining and by their corruption of the Indians. These practices became so disturbing that the North-West Mounted Police was formed, sent west, and built forts at Macleod and other strategic points near the border. Their arrival brought peace and harmony to the tribes; settlers soon followed, and the southern ranges became dotted with cattle ranches. When the Canadian Pacific Railway entered the province in 1883 Medicine Hat and Calgary became divisional points and grew in population. Two years later Lethbridge was joined to the main line by a

* A paper presented to the Calgary Medical Association in March, 1936. Other papers by Dr. Jamieson on the early medical history of Alberta can be found in the *Journal*, 1929, 20: 188; 1933, 29: 431, and 1937, 37: 388.

branch and soon became an important town. Then in 1890 Calgary and Edmonton were connected by rail and settlement took place at intervening points.

The medical services followed much in the order of settlement, and with the coming of medical men the need for hospitals developed. The first doctor to practise in Alberta was W. M. Mackay,* who landed at Hudson Bay in 1864, and served as factor and physician to the Company of Gentlemen Adventurers in the great North-West Territories and later in the Peace River country and at Fort Chipewyan. The spread of medical service in southern Alberta can be conveniently divided into two sections: (1) the mounted police period—the seventies; (2) the C.P.R. period—the eighties.

The police period.—When the mounted police force was organized in 1873 there was authorization for one chief surgeon. To this post Dr. George Kittson was appointed on April 3, 1874. Dr. R. Barrington Nevitt became first assistant surgeon.

DR. GEORGE KITTSON

Kittson was the second son of Commodore Kittson, of the Red River of the north, and was born in St. Paul's (later St. Paul), Minnesota, on August 16, 1844. He was a step-grandson of

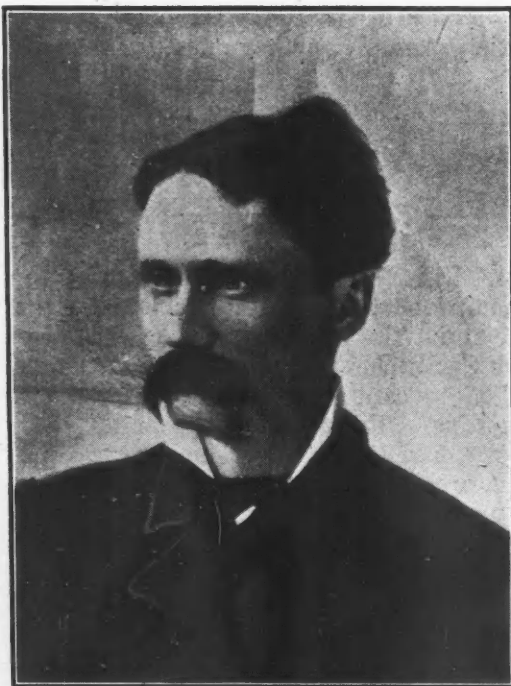


Fig. 1.—Dr. George Kittson, from a crayon drawing done at St. Paul, Minn., after his retirement from the North-West Mounted Police.

Alexander Henry who established a fur-trading post on the Red River for the North-West Company in 1801 and debauched the Indians with assiduity and success.

* Other reference to Dr. Mackay, with portrait, can be found in this *Journal*, 1937, 37: 388.

Kittson entered McGill University for the session 1864-65. He gave his residence as Berthier, Quebec, and religion, Church of England. For some unrecorded reason he did not attend the 1867-68 session, thus taking five years to complete what was then a four-years' course. He graduated in 1869. With Nevitt he accompanied the police on their march from Dufferin, Manitoba, across the plains. When the Belly River was reached Surgeon Kittson returned with the main column to Swan River, the place chosen as the future headquarters. Nevitt continued west with the party under Lieut.-Col. Macleod to establish the post at Fort Macleod. The accommodation for the full strength was found insufficient at Swan River, and Kittson returned to Winnipeg and finally to Dufferin, where he remained during the winter of 1874-75. In May or June, 1875, the headquarters moved back to Swan River, and Kittson remained there until August, 1876. In this year he was transferred to Fort Walsh, where he served until 1882, the year of his retirement. During his term at Fort Walsh frequent visits were made to Fort Macleod and other western posts. He was active on general and special services, and it would appear that he fulfilled these duties in addition to acting as chief surgeon. In 1879 the Department of Indian Affairs undertook to pay half of Kittson's salary. This serves to show the extent of his work as a pioneer doctor. It was during his sojourn at Fort Walsh that Sitting Bull and his American Sioux were refugees at Wood Mountain and a continual source of trouble to the Canadian authorities.

There is little record of Kittson's movements while in the West. Perhaps the only references to him are to be found in the diary of Dr. Nevitt. Unfortunately many valuable records of the pioneers have been lost. Dr. Nevitt's diary, with the exception of the last twenty-seven pages, has disappeared. A few excerpts from these are of interest. They show that Kittson was at Macleod.

Under the date, Tuesday, February 12, 1878, one reads: "All my patients doing well. Kittson's mouth is pretty sore. Some more spicules of bone came away this morning". Four days later one finds: "Kittson's face is improving and his strength getting better". Again on the 19th: "Sent in my report for 1877. Kittson engaged in writing his". A month after this: "Kittson had another bad turn while I was away, but has nearly recovered again".

Kittson was able to take a ride with Nevitt four days later. A final entry, under date of April 3rd, shows the departure of the chief surgeon for the Cypress Hills.

Kittson resigned on January 24, 1882, to take up private practice in St. Paul, Minn. He died on May 10, 1884, at the age of 38. The cause of his death was given as apoplexy. After seeing

the fragments of Nevitt's diary it was thought of interest to see what Kittson had to say, since every policeman was required to keep a daily record of his work. After a prolonged search the writer found that Dr. John M. Armstrong, of St. Paul, was interested also. The latter went to a lot of trouble and finally located the diary. Unfortunately it contained nothing of north-west experiences. An extract from Dr. Armstrong's letter is of sufficient interest to be quoted.

"This morning I spoke to a physician here who I found out had seen and read it about three years ago. He stated that it contained nothing about the mounted police or his north-west experiences. This must be so as he did not know that Dr. Kittson was ever connected with the mounted police.

"He stated that the scene of the diary is located mostly in Philadelphia, and describes his endeavours to discontinue the use of morphine to which he was addicted.

"This morning I went to the cemetery and noted the inscription on his tombstone, read as follows:

JOHN G. KITTSON
DIED MAY 6TH 1884
AGED 40 YEARS.

"In order to verify it I looked up his death certificate (he died here) in the Health Department, and to my surprise the two did not agree. The death certificate gives his age as 38 years and the date of

ville, Quebec. From this school in 1868 he matriculated in the University of Trinity College, Toronto. Here he met William Osler who had just arrived. He said that Osler "brought no marked reputation except that he was a good fellow and held the distance record for throwing a cricket ball". He also wrote: "One afternoon I had an engagement with W.O. and called for him at Bovill's office. The room was large and bare with a few chairs and a small deal table—like a kitchen table. Osler opened the drawer of the table—Dr. Bovill had gone out—and said: "Look here! This drawer has been filled to overflowing with bills two or three times this afternoon, and now look! One solitary bill lay in the drawer. As the patients paid their fees Osler placed them in a drawer. A needy patient came along, and Dr. Bovill reversed the process and handed money out so that the sick man might get his medicine and the food and other things required."

In 1871 Nevitt received his B.A., his M.B. in 1874. Eight years later, 1882, he returned to acquire his M.D. While at the University he joined the H.C. Queen's Own (Trinity), and thus became a Canadian citizen. Before graduation he lived in the Toronto General Hospital, first as a dresser and later as an assistant



Fig. 2

Fig. 2.—Colonel Macleod (hand on saddle), Dr. George Kittson on his left, Alfred Wilson holding the horse. Officer with back to camera not known. Fig. 3.—Richard Barrington Nevitt, N.W.M.P., 1874. On trek. Fig. 4.—Dr. George Allan Kennedy.

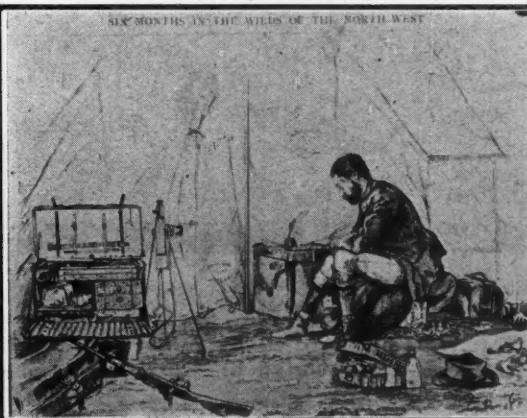


Fig. 3



Fig. 4

his death as May 10, 1884, cause—apoplexy. Born in the United States and single.

"As a matter of fact he committed suicide by taking a large dose of morphine. He was probably born at his father's trading post near Ft. Snelling.

"Dr. Kittson was a son of Norman W. Kittson's first wife and had no Indian blood."

DR. RICHARD BARRINGTON NEVITT

Of the first assistant surgeon there is more information. Richard Barrington Nevitt (Fig. 3) was born in Savannah, Ga., on November 22, 1850. At fifteen the Civil War was disrupting the social and educational life of the South, and young Nevitt came to Bishop's College, Lennox-

apothecary. Finally he acted as a house surgeon. Nevitt and Kittson accompanied the Six Troop of the police across the prairies in the summer and autumn of 1874. When Kittson turned back, Nevitt continued on past the Belly River with the party under Col. Macleod. At the fort named after the latter he remained until his retirement in 1878. His chief concern was with the mounted police but he ministered to the surgical needs of the few whites and breeds in the vicinity and the odd Indian, as will be seen.

With the construction of the original barracks a building was set aside as a hospital. No provision was made for a staff, so the custom de-

veloped of using the services of a regular member of the force as a dispenser, to be in charge of the drug supply, and in various ways to assist the surgeon. These men became known as hospital stewards, or according to rank—hospital sergeants. It was not until surgeon Jukes received the post of senior surgeon in 1882 that the practice of appointing a number of fully qualified pharmacists as hospital stewards, with the rank of sergeant, was inaugurated. In the same way a number of medical men were engaged as regular members of the force, and were given the non-commissioned rank of staff-sergeants. From the earliest days of the policing of the plains it was the custom for civilian patients to be treated in the police hospitals, since no other accommodation was available. This practice continued in some districts until the nineties.

The Macleod Hospital (Fig. 5), constructed in 1874, was the first in Alberta. In 1875 Fort Walsh had one. Other western posts followed: Qu'Appelle in 1881, Calgary in 1882, Regina in 1883, Maple Creek in the same year. Battleford and Prince Albert had hospitals in 1884.



Fig. 5.—North West Mounted Police Hospital at Macleod. Braithwaite was a patient there in 1887 with typhoid fever.

Lethbridge in 1886 had a mine hospital which was open to the police. Three years later they constructed their own hospital there.

Nevitt during his stay at Macleod recorded observations on the weather, movements of the force, and comments on amateur dramatic performances. Little of medical interest appears—an occasional complaint about his drugs being delayed in transit from Fort Benton, Montana Territory. Unfortunately most of his journal is lost. Only that part from November 23, 1877, until the fall of 1878 is in existence.

In December, 1877, Crowfoot, a famous Indian chief, was a patient. A short time after this he writes: "I operated upon Kennedy's woman in Jerry Pott's house this afternoon and removed a large piece of dead bone from the humerus near the head". On February 25th he writes: "A train is to go to Calgary tomorrow and is willing to carry a little freight". The next day: "The man Sproule took a box of drugs for me

to Lauder. This about completes his list. I packed up Herchmer's medicines. They are now ready awaiting shipment." From another item it would appear that the Lauder mentioned above was hospital sergeant in Calgary.

DR. JOHN DROUGHT LAUDER

Dr. John Drought Lauder was born in Ireland in 1857, attended Trinity College, Dublin, and then studied medicine for three years in Liverpool. In 1875 he sailed for Nova Scotia, where he remained for one year and trained as a veterinary surgeon. Then he joined the mounted police. In 1877 he became hospital sergeant. After two months as such he was transferred to Calgary, where he remained for two and half years in a medical capacity for the government. In 1880 Dr. Lauder served in different points in the northwest, and in 1881 became sub-agent of the Blackfoot Reserve. One year later he was foreman of the famous Cochrane Ranch, which was then under the management of Col. Walker. In 1885 Lauder joined Major Hatton's troop of Alberta Rifles as lieutenant. The rebellion quelled, Lauder ranched four miles north of Calgary for a number of years. He served two years on the Northwest Council at Regina, being elected in 1886. On the death of Dr. George Verey,* the first practitioner of Edmonton, Dr. Lauder was invited to locate in that village. His request for a bonus of \$2,400 a year was unacceptable to the citizens and he continued ranching. From 1892 he resided at Innisfail, Alberta, until his death, two years ago.

DR. HERCHMER

The Herchmer referred to in Nevitt's diary was the fourth son of the Rev. William M. Herchmer, of Kingston, Ont. He was born on December 9, 1849, educated at Brighton, England, and after studying medicine at Queen's University, Kingston, went to Louisville, Ky., where he graduated. In 1870 he accompanied the Wolsley Expedition to the Red River. He enlisted in the mounted police as a constable in 1874. He was stationed for a time at Fort Saskatchewan. Leaving the force he engaged in farming not far from there. Late in 1881 he was medical superintendent of the Northern Pacific Hospital at Brainard, Minn. Returning to Canada, he was in charge of the medical work on the C.P.R. construction in the mountains, with headquarters at Donald. He died at Egypt,

* Other reference to Verey, with portrait, can be found in the *Journal*, 1933, 29: 431.

Wash., on November 3, 1896. He was a brother of Commander Herchmer, late of the Royal North-West Mounted Police.

Nevitt returned to Toronto in 1878 to enter civil practice. When the Woman's Medical College was established in 1883 the Chair of Sanitary Science was occupied by R. B. Nevitt, M.D. Dr. A. McPhedran became Dean in 1887, but resigned the next year. Nevitt became his successor and discharged his duties as Dean and Professor of Clinical Surgery until the closure of the College in 1906. Following this, he continued his duties at the Woman's Hospital and Dispensary, and retained his surgery at St. Michael's Hospital. He was a charter member of the Toronto Academy of Medicine. Shortly before his death on May 11, 1928, this Society made him an Honorary Member *in perpetuo*. His passing removed one of the links joining eastern and western Canadian medicine, and its recent date shows how close to the present was the past in southern Alberta.*

MEDICAL MEN AT FORT MACLEOD, LETHBRIDGE AND PINCHER CREEK

Since Fort Macleod was the centre of population in the south in the seventies one must make note of several police surgeons before mentioning practitioners of Pincher Creek and Lethbridge, the next two centres requiring medical aid.

Dr. George Allan Kennedy (Fig. 4) received his appointment as an assistant surgeon on October 1, 1878, and was sent to Fort Macleod. In 1880 he was at Fort Walsh, where he remained until October, 1882, when he returned to Fort Macleod. He resigned his commission in July, 1887, but returned in a temporary capacity for a short time in 1888. He was born on April 16, 1858, in Dundas, Ont., and obtained his degree in 1878 from McGill. He was an ardent and expert polo player and did much to advance this game in the West. In 1889 at the Banff meeting of the Canadian Medical Association he presented a paper on "The climate of Alberta", which was the first medical paper to be delivered by a practitioner of this province.

Dr. H. Y. Baldwin served in Macleod from 1887 to 1888. He belonged to a well known family in Ontario. He died a few years ago in Edmonton. Peter Aylen, 1891 to 1894 at Macleod, was a McGill graduate (1886). He was

in Calgary from 1889 to 1891. He died a few years ago at Fort Saskatchewan. F. E. Powell served there from 1887 to 1889. J. C. McNamara served at Macleod in 1889, and was in Calgary in 1890, but for how long it has not been possible to ascertain.

E. A. Braithwaite (Fig. 8), the present Chief Coroner of Alberta, was with the police in Macleod in 1886. He joined the force on May 7, 1884. Immediately on completing his drill and riding school the authorities found out that he was a medical student, and he was made hospital sergeant at Regina. In 1885 he was sent as medical attendant to Prince Albert. No sooner there, than he left with the police, 300 strong, to go to Fort Carleton. There he arrived just after the Duck Lake fight and was busy with the wounded. After the Battle of Batoche Riel was captured. Dr. Braithwaite was present at his execution. In 1885 he was hospital sergeant at Lethbridge. He writes:

"In the Spring of 1886 a young doctor arrived under contract with the Galt mines, and he became acting assistant surgeon, and I retired to the lesser dignity of hospital sergeant. In September there was built a combined police and miner's hospital. I was the first to sleep in it and this was the beginning of the present Galt Hospital in Lethbridge." (Fig. 6).

The young doctor mentioned above was the late F. H. Mewburn one of a long line of medical



Fig. 6.—The small building was the first hospital in Lethbridge (Galt Hospital).

military men. One Francis Mewburn, in 1765, in the city of Durham, England, signed articles with a medical practitioner for a term of seven years to learn "the Art, Science and Mystery of an Apothecary". For the sum of fifty pounds he was to receive, "good, wholesome and sufficient meat, drink and lodging fit and convenient for him". He practised in Whitby, England, for many years. When Napoleon threatened to invade England he obtained a commission as a Captain of Volunteers.

* For other details relative to Dr. Nevitt, with portrait, see this *Journal*, 1928, 19: 382.

John Mewburn, son of the above, practised in England until 1832, when he emigrated to Canada. His son F. C. Mewburn also studied medicine, and in 1838 passed the medical board of Upper Canada. After serving as a military surgeon with a coloured corps he settled in Weston in 1845. From here he moved to Niagara Falls, where he resided for thirty-five years. While there he received an honorary degree from the University of Buffalo. Frank

Hamilton was at that time professor of surgery in that institution and a friend of Dr. Mewburn's. The latter moved to Montreal and later lived in Toronto.

Dr. Frank Hamilton Mewburn (Fig. 9) was born at Drummondville, which was near Niagara Falls, in 1858. After graduation from McGill University in 1881 he served as an intern in the Montreal General Hospital (Fig. 7). There were three others—Alex Henderson who was the first civil practitioner in Calgary, James Bell, later Professor of Surgery in McGill, and John A. MacDonald. The Canadian Pacific Railway was opening up the west now and Mewburn had a roving spirit. He went to Winnipeg and was appointed house surgeon in the Winnipeg General Hospital. In 1885 the rebellion broke out and he was in charge of the Military Hospital in the Manitoba capital. From 1886 until 1913 he was medical officer to the Galt Coal Company in Lethbridge. Moving to Calgary in the latter year, he specialized in surgery. When the Great War started, true to family tradition, he went overseas as a Major in the C.A.M.C. Becoming a Lieut.-Colonel in 1916, he was placed in charge of the Surgical Division at Taplow. In 1918 he was invested by His Majesty with the Order of the British Empire. When the University of Alberta added the final years to its course of instruction Dr. Mewburn became the first Professor of Surgery in the medical faculty. He died on January 29, 1929. His son, H. H. Mewburn, is an orthopaedic surgeon in the same University, and a grandson is a medical student. Probably no family, at least from Quebec west, has a medical record of nearly two hundred years. The O'Reilly's and Orton's, of Ontario, perhaps come next in length of time.

Another pioneer of Lethbridge deserves mention. Dr. Leverett George de Veber joined the



Fig. 7.—Montreal General Hospital interns, 1882. *Sitting*, John A. Macdonald and James Bell; *standing*, A. Henderson and F. H. Mewburn.

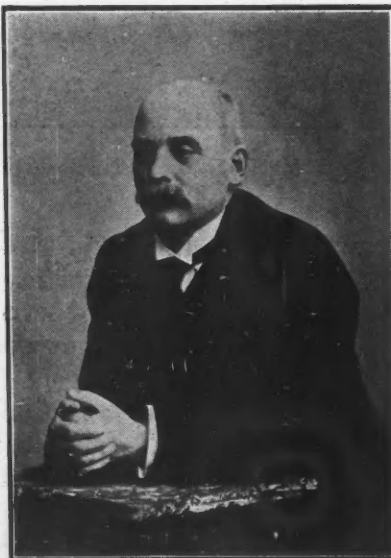


Fig. 8.—Dr. E. A. Braithwaite.



Fig. 9.—Colonel F. H. Mewburn.

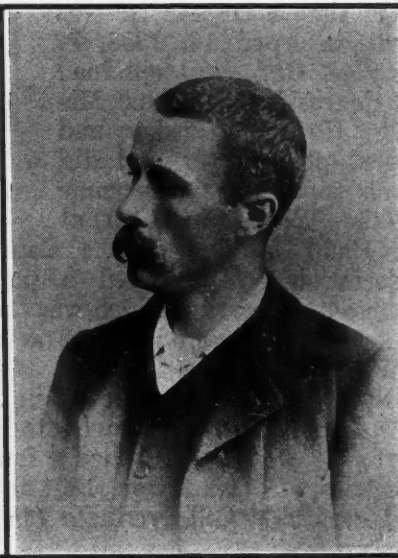


Fig. 10.—Dr. H. Rimmington Meade.

police as surgeon in 1882, and served at Fort Walsh, Fort Macleod, and Calgary. He resigned in 1885 to practise in Macleod. In 1893 he became Medical Officer Health in Lethbridge. Five years later he was elected to the North-West Assembly at Regina. In 1905 he was elected to the Alberta Legislature, but receiving an appointment to the Senate he did not take his seat in the local House. He died July 9, 1925. Following these two first practitioners of Lethbridge came Drs. W. S. Galbraith in 1899, P. W. Tuller in 1904, C. C. Cragg in 1905, P. M. Campbell in 1906, A. A. McNally in 1907, and D. A. Taylor and J. E. Lovering in 1908.

Pincher Creek also deserves attention. In 1882 ranching having commenced in that district, Dr. H. Rimmington Meade (Fig. 10), was encouraged to start practice. He received his medical education in England. Evidently his professional duties were not arduous, for Dr. Meade was one of the organizers of a Hunt Club. This club formed in 1883 was not the success it was expected. Fox hounds were imported but were no match for the coyotes. These hounds run by scent and the coyotes were too fast for them. Meade also became an expert polo player and a member of the second oldest club in America. He died at Pincher Creek in 1898. Dr. Montgomery Smith, another English graduate, joined Dr. Meade but after several years in partnership returned to his native land. These men were succeeded by Dr. S. W. Hewetson who was killed in action, R. de Lotbinière Harwood, now of Vancouver, and George H. Malcolmson, of Edmonton.

There was nothing spectacular, nothing heroic in the lives of these men in the early days of medical practice in southern Alberta. All the pioneer doctors, with the exception of Meade, Smith and Mewburn, started with the police, and later as the civilian population increased doffed their red coats to try their fortune among the ranchers and inhabitants of Macleod, Pincher Creek and Lethbridge, the centres south of the main line of the C.P.R. Supplies were hard to obtain, having to come in by way of Montana, but, with an ingenuity born of necessity and what skill was given them, they rode the long and uncertain trails of the foothills and prairie, giving service and courage to their patients.

“Also, loke that thou drynke not pure watir when thou hast eten thi mete, but if thou have usid it; for the cold watir put upon thi mete coldith thi stomak and quenchith the hete of thi digestioun, and confoundith and grevith thi body. And if thou muste drynke watir for the grete hete of thi body or of thi stomak, take it attemperately, and not ovirmoche attones ne to ofte.”

—*Secreta Secretorum.*

Association Notes

The Sixty-ninth Annual Meeting of the Canadian Medical Association, Halifax, N.S., June 20-24, 1938, Conjointly with the Nova Scotia Medical Society

The arrangements for the coming meeting of the Canadian Medical Association are proceeding apace, and there is every indication that the gathering will be an unqualified success. The letters from His Honour the Lieutenant-Governor of Nova Scotia and His Worship the Mayor of Halifax, speak for themselves. Their messages of welcome are much appreciated.

To
The President and Members of
The Canadian Medical Association,
Gentlemen:

On behalf of the people of Nova Scotia it gives me great pleasure to extend to the Canadian Medical Association a most cordial invitation to our City and Province and to assure you we will endeavour to make your visit a most pleasant one.

Yours sincerely,

(Signed) ROBERT IRWIN,
Lieutenant-Governor.

The President and Members,
Canadian Medical Association.

As Mayor of the City of Halifax I extend to you and your members the freedom of the City for the duration of your Convention or longer, if you could use it.

Our City is an old one with many points of historical interest; its health services are well advanced for a city of its size; its opportunities for enjoyment such as golfing, boating, deep sea fishing, game fishing, etc., are unexcelled in Canada; and these, together with the friendliness of the citizens of Halifax, I feel sure will cause your stay here to be a very pleasant one.

Wishing every success to your Convention, I remain,

Yours very truly,

(Signed) WALTER MITCHELL,
Mayor.

Clarke Steamship Company, Limited, Dominion Square Building, Montreal: Sailings from Montreal and Pictou in June.

The S.S. *New Northland's* itinerary is as follows:

Leave Montreal Tuesday, June 14, 8.30 p.m.

Arrive Quebec Wednesday, June 15, 8.30 a.m.

Leave Quebec Wednesday, June 15, 2.00 p.m.

Arrive Ste. Anne des Monts Thursday, June 16, 2.00 p.m.

Leave Ste. Anne des Monts Thursday, June 16, 3.00 p.m.

Arrive Gaspé Friday, June 17, 7.30 a.m.

Leave Gaspé Saturday, June 17, 4.00 p.m.

Arrive Summerside Saturday, June 18, 10.00 a.m.

Leave Summerside Saturday, June 18, 4.00 p.m.

Arrive Charlottetown Saturday, June 18, 9.00 p.m.

Leave Charlottetown Sunday, June 19, 4.00 p.m.

Arrive Pictou Sunday, June 19, 9.00 p.m.

Leave Pictou Monday, June 20, 5.00 p.m.

Arrive Comeau Bay Wednesday, June 22, 11.00 a.m.

Leave Comeau Bay Wednesday, June 22, 6.00 p.m.

Arrive Saguenay River Thursday, June 23, 5.00 a.m.
 Leave Saguenay River Thursday, June 23, 11.00 a.m.
 Arrive Murray Bay Thursday, June 23, 3.00 p.m.
 Leave Murray Bay Thursday, June 23, Midnight.
 Arrive Quebec Friday, June 24, 7.00 a.m.
 Leave Quebec Friday, June 24, 2.00 p.m.
 Arrive Montreal Saturday, June 25, 8.00 a.m.

The Cruise Rate on this sailing runs from a minimum of \$75.00, but the one-day rates have not yet been definitely decided upon.

The rate for an automobile, when accompanied by passenger, from Pictou to Montreal is \$20.00, \$25.00 or \$30.00, depending on the wheel-base.

The Committee on Housing and Hotels advises all those wishing hotel reservation to write *AT ONCE*, direct to the hotel of their choice. If that hotel is filled to capacity the Committee will do its best to provide the next best accommodation.

Following is a list of the hotels with their capacities and rates:

Nova Scotian Hotel, 100 double rooms, \$5.00 - \$6.00
 Lord Nelson Hotel, 100 double rooms, single \$3.00; double \$5.00 up; suites \$8.00 up.
 Carleton Hotel, 25 rooms, single \$1.50 up; double \$3.00 up.
 Halifax Hotel, 75 rooms, single \$2.00 up; double \$3.50 up.
 Queen Hotel, 75 rooms, single \$1.50 up; double \$2.50 up.

Those wishing to reserve accommodation in smaller establishments or in some of the nearby seaside hotels should communicate with the Chairman of the Committee who will gladly forward lists of such places—*Chairman*, Dr. A. R. Morton, 2 Brenton Place, Halifax, N.S.

Our readers are advised that the May issue of the *Journal* will be the SPECIAL CONVENTION NUMBER, and will contain the advance program and much interesting matter in relation to the city of Halifax and its institutions, together with other details.

Medical Societies

Regina General Hospital

Dr. J. C. Paterson gave the pathological report for the past eleven months at the staff meeting of the Regina General Hospital on February 11th as follows.

"Appendicitis.—From March 1st to October 1st there were 316 appendiceotomies; of these 84 were routine cases, leaving 232 operated on for appendicitis. Clinically, 78 per cent were considered to be acutely or subacutely inflamed; pathologically, 54 per cent showed inflammation, a clinical diagnostic error of about 25 per cent. For the ensuing four months, that is, October 1st to January 31st, there were 173 appendiceotomies for appendicitis; of these 65 per cent were thought, clinically, to be acutely or subacutely inflamed; pathologically, 50 per cent were inflamed, a clinical diagnostic error of only

15 per cent. For the two series of cases then, the latter showed an improvement in clinical diagnosis of almost 50 per cent.

"During the last four months there were 26 cases wrongly diagnosed; only 10 of these had had white blood-cell counts done, and in 7 of the 10 the count was below 10,000; in spite of this, the clinical diagnosis was acute or subacute appendicitis. Three cases were diagnosed as acute appendicitis where the white-cell count was 12,000; 14,000; and 15,000. The appendix was essentially normal in each case, with one exception in which a pin worm was present and probably caused obstruction. In the other two cases no cause for pain or increased white cell counts was found in the appendix.

"Several appendices routinely removed during gall-bladder surgery have shown subacute or acute inflammation; in one of these cases the gall-bladder was normal. Thus we note that appendiceal pain may simulate gall-bladder inflammation, and gall-bladder and appendix inflammation go hand in hand. The tests for suspected appendiceal inflammation in the operating room are infiltration and the loss of the normal faecal content of the appendix. It is remarkable how many acute and subacutely inflamed appendices have been removed in this hospital in eleven months; about 200. I believe that appendiceotomy is usually justified if there are any suggestive symptoms; the removal of a normal appendix is no disgrace. However, there is a tendency to call too many of these appendices inflamed when there is no definite clinical evidence except pain to back up the diagnosis. These cases would be better diagnosed as appendicitis with a large question mark.

"Gynecology.—Curettage. There were 172 in 6 months; there were 13 cases of therapeutic and 2 of inadvertent abortion; there were 65 cases of retained secundines; 9 of these were in unmarried girls; there were 5 cases of cancer of the uterus. There were 86 cases of endometrial hyperplasia; 15 of these were of the typical Swiss cheese variety of the type resulting in uterine bleeding. The remainder were essentially normal, but that is no reason why a curettage should not have been done. Probably many were done as routine procedures preceding hysterectomy for fibroid, for sterility or dysmenorrhœa, in which cases the scrapings would show no lesions.

"Ovaries.—There were 72 ovariectomies in the 6 months' period; 50 of these were of the entire ovary. Fourteen ovaries were removed for small follicular cysts; in these 14 cases the ovary was needlessly sacrificed, simple excision of the cysts would probably have sufficed unless there was definite clinical evidence unknown to the pathologist, why complete ovariectomy was indicated.

"Thyroid.—From March 1st to October 1st there were 46 thyroidectomies; 22 of these were

diffuse hyperplasia; 16 cases were hyperplastic adenoma, all toxic; 2 cases were Riedel's struma, and 2 cases Hashimoto's disease; 4 cases were colloid goitre.

"*Gall-bladder.*—From March 1st to October 1st there were 49 cholecystectomies and 6 cholecystostomies; 30 of these cases had gall stones. Of the 49 cases 48 showed pathological conditions. One gall-bladder was normal, but the appendix in this case showed a subacute inflammation which was very probably responsible for the patient's symptoms. For the remaining 4 months, October 1st to January 31st, there were 19 cholecystectomies; one gall-bladder was normal, all the rest were diseased. This normal case gave a history of indigestion and colic for 11 years, and the x-ray diagnosis, not done in this hospital, was chronic cholecystitis. Gall-bladder dye tests were done on 7 patients in this hospital who afterwards were operated on; it is a pleasure to report that when cholecystitis was reported by our radiologist it was found pathologically, and where stones were visualized they were present at operation. Our radiologist was therefore 100 per cent accurate over this series.

"*Breast surgery.*—March 1st to January 31st. There were 49 specimens; 14 cases of carcinoma, radical operation; 14 cases of adenofibroma, quadrant removal; 3 cases of chronic mastitis (mazoplasia) simple mastectomy; 15 cases of chronic cystic mastitis, 7 quadrant removal, 8 simple mastectomy; 1 case of chronic suppurative mastitis, radical removal; 1 case of fat necrosis following frost-bite, simple mastectomy; 1 case of hypertrophy, simple mastectomy. It is important to verify the clinical diagnosis of malignancy by quick section or by a two-stage operation before performing radical and mutilating operations.

"*Autopsy report.*—There were 159 autopsies during 1937 which was 48.3 per cent of the deaths; in 1936 autopsies were done on 14 per cent of the deaths. I congratulate the staff on their efforts in this respect. It is probable that few hospitals in Canada admitting private patients as well as public ones can duplicate this figure.

"Malignant disease was the cause of death in 20 per cent of the autopsies. Heart disease in 13 per cent was made up of a variety of lesions. Bronchiectasis with its resultant increased intrapulmonary pressure caused failure of the right heart in 4 cases. Coronary disease, with or without thrombosis, accounted for only 5 per cent of the deaths. There is reason to believe from newspaper reports that coronary thrombosis is far commoner here than our figure suggests; almost every week one reads of a sudden death on the street or in the house which on coroner's autopsy is diagnosed as a heart attack; it is a pity that these autopsies are not per-

formed by people who are interested in heart lesions.

"There were 2 cases of phimosis in infants, with resulting hydronephrosis and uræmia; neither was diagnosed clinically. There were 2 cases of streptococcal and staphylococcal bacterial endocarditis which did not improve with prontosil. There were two cases of congenital cystic kidneys, one in a man 50 years old, both died of terminal uræmia. There were 3 cases of anterior poliomyelitis; 3 cases of meningococcal meningitis, 2 of which were treated with serum.

"We have had 8 autopsies on patients from the eye, ear, nose and throat department. Two of these were cancer (a) cancer of the larynx, which in spite of radiation therapy went on to complete obstruction and eventual bronchopneumonia; (b) cancer of maxillary antrum which invaded the brain and resulted in meningitis.

"There were 2 cases of sphenoidal sinusitis. Both of these fatalities followed surgical intervention; in one case meningitis followed submucous resection, while in the other a nasal polyp had been removed ten days before. In each case the operative procedures had apparently lighted up a chronic infection of the sphenoidal sinus, which had spread to the meninges.

"There was 1 case of maxillary sinusitis. This infection was acute and followed drainage; the patient ran a high temperature and died of septicaemia.

"There were 2 cases of chronic otitis media. One case developed brain abscess following mastoidectomy. The other case differed in that meningitis developed from a chronic mastoid infection which had not been treated surgically. This case developed streptococcal meningitis and died in spite of prontosil therapy.

"The most interesting case in this series is one of chronic tonsillitis which, after tonsillectomy, developed septic thrombosis of the jugular vein and eventually cavernous sinus thrombosis. This case shows that even the most minor surgical procedures carries a definite operative mortality."

LILLIAN A. CHASE

TREATMENT OF THREADWORMS.—A. Castellanos, A. V. Paussa and J. P. Trujillo, who record 24 illustrative cases, maintain that the citrate of iron and ammonia in large doses—amounting to 6 to 8 grams in all—two or three times a day is well borne by children, and in such amounts has a destructive action on threadworms. Some cases, however, prove refractory, and it is impossible to say if they can be sterilized by larger doses, such as 5 to 12 grams, for example. The drug is also very effective when given in enemata which enable it to reach the cæcum.—*Bol. Soc. cubana Pediat.*, October, 1937, p. 425. Abs. in *Brit. M. J.*

Special Correspondence

(The following note on medical conditions in Northern Nigeria has been sent us by one of our younger graduates, Dr. Guy H. Fisk. Dr. Fisk has contributed to our columns and we welcome his interesting sidelights on conditions in one of the less conspicuous portions of the British Dominions.—Ed.)

Medical Practice in Northern Nigeria

If variety is what you like, then Northern Nigeria is the place for it. Medicine as practised in the Plateau Province of Nigeria provides unending variety and sufficient work for the most ambitious. Indeed in some stations, in addition to being the doctor, the medical officer may be the only white man in the district when the administrative officer goes on tour. He will then have to receive the police reports and review the armed guard, in addition to his medical duties.

I was sent to take charge of an African hospital in a town called Jos. It had 130 beds, divided among six wards. In addition to this there were small, round mud huts which had to be used for the overflow. When all these were filled we then had to put patients on the floor between the beds. This gave us a total capacity of about 180 patients. Enough, you might consider, to keep one doctor busy. Besides this there was a daily outdoor of 110 to 140 patients; also, a ward at the government prison with a capacity of 10 beds which required a daily visit. The staff which looked after this hospital consisted of 1 white nurse, 18 black male nurses, 3 black female nurses, 10 native ward servants and labourers, and 2 black dispensers.

The white nurse supervised the rest of the staff and looked after stores. This was essential, as everything in the hospital had a saleable value. Unless great care was taken and supplies issued in small amounts we should have shortly found ourselves without anything to work with. The native staff was helpful as far as it went. Unfortunately, it did not go very far when judged by our western standards. Night nurses had no shame about getting into bed and sleeping with the patients if they were not checked up. However, they all meant well, and when one learned not to expect too much from them they did very well. Anything really important had to be done by one's self. Another interesting thing about the staff was their fatalism. If they thought a patient was going to die, no matter whether he was a close relative or not, they could not see the sense of working over him in an attempt to save him. This led them occasionally to neglect a seriously ill patient for one not so sick.

In spite of being in the tropics, tropical diseases did not predominate. Surgery was the largest part of the work. In six months I performed 584 operations, roughly three a day. These were divided into 322 minor operations,

and 262 majors. Amongst the minors were dental extractions, entropions, dilatation and curettages, submucous resections, Colles' fractures, and similar things. The majors included amputations, hernias, strangulated and simple, resections of intestine, thyroidectomies, cataracts, hydroceles, empyemata, compound fractures of the skull, splenectomy, phrenic evulsions and suprapubic cystostomies. In spite of the varied list the mortality was only eight. Three died from tetanus contracted before they reached hospital after small accidents; 2 died from carcinoma too far advanced to be benefited by surgery, and 3 died from generalized peritonitis present when the abdomen was opened. One of the peritonitis cases was a perforated typhoid ulcer; one, a strangulated hernia of six days' duration with complete necrosis of the jejunum; and the last, a ruptured gall bladder with generalized peritonitis of five days' duration. As the African native only comes to hospital after he has tried all the native medicines it is not too bad a record.

The most common medical condition was pneumonia, and the African has the same poor resistance to it that the European shows. Then, in the district of Jos sleeping sickness, or trypanosomiasis, was common. Syphilis and gonorrhœa were both plentiful. Amongst the rare diseases were, disseminated sclerosis, sickle-cell anæmia, and "mossy foot". Every medical condition is seen sooner or later, however, even to hysteria. This latter may sometimes be simply cured, but often resists the most well meant efforts.

The hospital had a small laboratory and autopsy room with a trained attendant who did all the routine urines and stools. Anything unusual or complex I had to do myself. Differential blood counts were beyond him, although he was able to spot trypanosomes and some of the malarial parasites. He could do Kahn tests when supervised. As the autopsies were all in medico-legal cases they required considerable care and evidence had to be produced in court which might even result in a man being hanged. Many people died out in the "bush", and when the death was reported, if the administrative official thought it looked like murder an autopsy would be ordered.

The African native is still very primitive, even when he has a western veneer over his bush background. When you are taking a history he will always endeavour to give you the answer that he thinks pleases you, so that histories are very unreliable. Then again none of them know how old they are. They will sometimes guess, but generally the nearest you can get is that they had just reached puberty when the white men came to the country. Or else that they had just got married when they had their first ride in a railway train. Another one of his traits is

that he has a firm belief in witchcraft and magic. A patient with an ulcer on his leg will quite seriously state that it was caused by evil spirits and stick to his story. Any cerebral manifestations, such as paralysis, etc., in their eyes are always due to supernatural causes, and nothing will shake this belief.

If a patient feels better he at once decides that he is cured, and must go home even if home means a walk of fifty miles or more. Pneumonia patients will get up the day after their crisis, and three days later abscond from the hospital. Strange as it may seem, they survive. Thyroidectomy patients leave the hospital once the sutures are removed and sometimes even before. None have dropped dead yet, although I always expected to see them collapse before they reached the door. Only those who are physically unable to walk can be kept in bed; the rest get up and walk around during the day. When they see the doctor coming for ward rounds there is a mad scramble for the beds, and as you enter the ward you see patients running in from all directions.

Patients have either to walk to hospital or to get some friend to carry them. I have seen men and women carried "pick-a-back" with broken legs, pneumonia, and other serious diseases. They will probably have travelled for two or three days like this, and even then they survive.

Native medicines are legion, and vary from the educated Moslem type to the primitive pagan variety. The Moslem type is to write a charm on a slate or paper and wash it off with water and then drink the water. This, at least, is harmless. The pagans love to put a handful of cow manure or dirty palm oil on a wound and then a leaf on top of that. This usually converts a small scratch into an ulcer about five inches in diameter in a few days.

This rough sketch gives an idea of the work that a medical officer is called on to do in Nigeria. As a place to study diseases that have long since disappeared from the civilized world it is unrivalled. Small-pox in all its most malignant forms can be seen daily; leprosy, syphilis and tuberculosis are present in every stage and form imaginable. All the diseases which we know to be due to dirt and filth are rampant. The government staff and hospitals do their best, but what can one hundred odd doctors do in the midst of twenty million untutored savages but merely scratch the surface? The hospital at Jos alone serves over a million people. Gradually, by education, it is hoped to eliminate some of the worst epidemics, but even this will take half a century. For the doctor who works here it is better than a textbook, for within a month you will have seen all the diseases mentioned in Osler, from typhoid to aninism; and what more could a medical man desire?

GUY H. FISK, B.A., M.D., C.M.
Jos, Northern Nigeria. D.T.M.&H.

Letters, Notes and Queries

Histological Indications of the Sites of Air Leakage from the Lung Alveoli into the Vascular Sheaths during Local Overinflation of the Living Cat's Lung

To the Editor:

Since the publication in this *Journal* of my address on Experimental Pneumothorax, which was given at Milan, Italy, before the International Anatomical Convention, I have gone further with this research and have found what I think is a reliable indication of the situation of the ruptures occasioned by the prolonged overinflation of a local region of the living cat's lung through a catheter introduced *via* the trachea. After a suspension of fine carmine particles in hot gelatin is injected into the formerly overinflated part, immediately following the collapse of the lung, through the same catheter, which was allowed to remain in place, and after the swollen part is cooled, fixed and sectioned, there are found accumulations of carmine grains on the alveolar bases overlying the vascular sheaths. The latter now contain gelatin, in addition to the bubbles of air remaining from the interstitial emphysema resulting from the overinflation. This finding suggests that the hot gelatin passed through artificial openings in the alveolar bases, representing the ruptures through which the air had previously escaped, which were in this case so small that they held back the carmine grains. This impression is strengthened by the observation that the gelatin within the vascular sheaths often contained few or no carmine grains. Again, in some places, the gelatin in the sheaths was marked by streams of carmine grains which had obviously come from the bordering alveoli through holes of a size so large that they failed to filter out the carmine particles. This finding gives support to my original supposition that air was leaking out from the alveoli, not through holes in the visceral pleura, but through the alveolar bases which border upon the vascular sheaths, and that thus was produced an interstitial emphysema. If air continues to break through from the alveoli it dissects a "false passage" in the vascular sheaths and pours into the mediastinum which it dilates; and if the quantity of air is sufficiently great there ensues a rupture of the mediastinal wall with escape of air into the pleural cavity, and the production of pneumothorax with massive collapse of the lung. Details of this mediastinal emphysema and rupture are to be found in my original paper. (Pneumothorax with massive collapse from experimental local overinflation of

Answers to letters appearing in this column should be sent to the Editor, 3640 University Street, Montreal.

the lung substance, *Canad. M. Ass. J.*, 1937, 36: 414).

I reported this gelatin work at Königsberg, East Prussia, on August 25th last, to the Anatomische Gesellschaft, and it has appeared in the "Verhandlungen" of that Society, page 78 (see *Ergänzungsheft zum anatomischen Anzeiger*, Bd. 85, 1938).

C. C. MACKLIN.

London, Ont.

Panel Practice in Great Britain

To the Editor:

In the January issue of the *Canadian Medical Association Journal* I saw your request for information and impressions of the panel system in Great Britain. As I have been practising here for over a year in a practice with a moderately large panel I thought my impressions might be of interest.

First let me state that my reaction to the panel system as a whole is favourable though this is certainly far short of perfection. I think it is a valuable step towards the goal of preventive medicine and should be welcomed as such, though we should at the same time recognize its faults.

Panel patients are expected to come to the doctor's office, if possible, and are not to call the doctor between 8 p.m. and 8 a.m. except for emergencies. I have very rarely found these regulations broken—the exceptions being very nervous patients who become panicky and call one out during the night. The great majority of those who come to the office during the regular hours are quite justified in seeking advice, though there is the occasional neurotic who becomes an absolute pest. The problem of patients repeatedly coming without justification I have found to be very trivial. Against this disadvantage one can place all those patients whose disease was diagnosed earlier because of their seeking attention in time (e.g., early tuberculosis), and also those who require prolonged treatment (e.g., myxœdema, peptic ulcer, auricular fibrillation, pernicious anæmia) and who probably could not be persuaded to continue it if it cost them anything. In my experience this last group was many times more numerous than those who sought advice without justification.

The Approved Societies are a very valuable part of the system, giving the insured person a certain proportion of their income while they are unfit for work. Due to this, people are able to stop work when they really should; in such things as acute bronchitis and chronic appendicitis this makes it possible to persuade the patient to have proper treatment and thus avoids many complications. The presence of a divisional medical officer to whom the approved society or the doctor may appeal as a referee in

cases of suspected malingering is also a very valuable proviso. The patient's own doctor gives his report of the case and can be present at the examination by the divisional medical officer if either party desires it.

The scope of the treatment is that which would be expected of the average general practitioner. At present there is not sufficient provision made for specialist attention. I have seen many patients whose teeth were in a very bad condition but who could not afford to have them properly treated. Similarly, patients in need of glasses who could not get them. In many cases both these types of treatment can be obtained through the National Health System, but it should be made universal if the efficiency is to be satisfactory. Surgery and other specialist treatments on panel patients are done in the public wards or out-patients' departments of hospitals, the consultant receiving no fee for it—hardly a fair arrangement.

From my experience of a panel with about 1,300 patients I would say that that number is sufficient to keep one man busy, even if he had no private work. In contrast with this is the maximum of 2,500 allowed to one man under the National Health Act. I would say that one thousand would be a suitable maximum; even then satisfactory treatment could only be given if the private work was light. Of course the figure of 2,500 is closely related to the ridiculously low capitation fee under the British panel scheme. Any change in the maximum numbers allowed to one practitioner would have to be accompanied by a rise in the capitation fee.

In conclusion, I consider the panel scheme is justified, since, by giving earlier treatment in serious diseases and medical supervision in minor ailments, it is a step forward in the field of preventive medicine. The neurotic is a minor element and the malingerer can be dealt with by reference to the regional medical officer. The approved societies, by their form of insurance, make the burden lighter on a poor man while incapable of work, and make more effective treatment feasible. The most urgent changes needed are a rise in the capitation fee, associated with a reduction in the maximum number of panel patients allowed to any one practitioner. After this I would suggest that arrangements for specialist treatment for everybody should be made.

P. M. YOUNG, M.D.

North Place,
Hatfield, Herts, Eng.,
February 20, 1938.

P.S. I have confined myself strictly to my own experiences and opinions in this letter, and have not included descriptions of other practices of which I have heard but of which I have no personal experience.

Medico-Legal

The Liability of Hospitals

(Prepared by the Executive Committee of the Canadian Medical Protective Association, Ottawa)

A few weeks ago the Court of Appeal for the Province of Ontario gave judgment in the case of Vuchar and The Trustees of the Toronto General Hospital to determine the liability of a hospital for the negligence of its servants.

The judgments of the Chief Justice of Ontario and of Mr. Justice Masten contained in the 1937 Ontario Reports at page 71 contain a very clear and full discussion of the various authorities dealing with this branch of the law, and for the information of the profession at large it may be of interest to summarize what has been determined to be the liability which the hospital assumes for the negligence of its servants and at what point the burden of responsibility will rest upon the doctors and their professional assistants alone.

1. The responsibility of the hospital authorities is limited to undertaking that the patient shall be treated only by experts, whether surgeons, physicians or nurses, of whose professional competence the authorities have taken reasonable care to assure themselves, and, further, that these experts shall have at their disposal for the care and treatment of the patient fit and proper apparatus and appliances.

2. The hospital is not responsible to patients for mistakes in medical treatment or in nursing on the part of its professional staff of doctors or nurses, of whose professional skill it has so assured itself, nor for the negligent use by them of the apparatus or appliances which are at their disposal.

3. The hospital is responsible to the patient for the due performance by the members of its professional staff within the hospital of their purely ministerial or administrative duties. This means the hospital is legally responsible to the patient for the due performance by its servants within the hospital of such duties as the attendance of a nurse in the wards, summoning of medical aid in case of emergency, the supply of proper food and the like. The management of the hospital makes its own regulations in respect to such matters of routine, and it is legally responsible to the patient for their sufficiency, their propriety and the observance of them by its servants.

So far as interns are concerned, there are certain cases in which they may act as physicians and surgeons, and, in such cases, their relation to the hospital is the same as that of a visiting physician or surgeon, and the hospital is not responsible to patients for their mistakes in medical or surgical treatment. But, for the most part, they act in another capacity. The hospital has a regular staff of physicians and

surgeons and these, unlike the interns, are not constantly in attendance at the hospital; they must frequently be sent for, and the hospital undertakes to send for them through its agents. The interns are the agents to perform this duty, and it is a rule in every well-ordered hospital that in all cases requiring immediate and important action, in all doubtful cases, and in all cases requiring an immediate operation, the intern shall send for the physician or surgeon in charge of the case, and, if he cannot be found, the intern must use all reasonable means to secure another in his place. If the intern neglects to call the physician or surgeon in the class of case designated, his neglect is the neglect of the hospital and liability will result.

It is clear from the leading decisions that the moment the door of the theatre or operating room has closed for the purposes of an operation the servants of the hospital in attendance cease to be under the orders of the hospital and are at the sole disposal and under the sole orders of the operating surgeon until the whole operation has been completely finished. The surgeon is, for the time being, supreme, and the hospital cannot interfere or gainsay his orders. The nurses and carriers, therefore, assisting at an operation, cease for the time being to be the servants of the hospital, inasmuch as they take their orders from the operating surgeon alone and not from the hospital authorities. What is equally so, but not so generally known, is the case where the patient does not enter the operating room, but instead goes to the clinical room for observation and then to one of the wards. Those assisting the attending physician or surgeon in carrying out his instructions are just as much under his direction as though they were in the operating theatre itself, and the hospital authorities are free from liability for any negligence which may arise out of the way these professional instructions are discharged.

In brief, this is the state of the law disclosed by the judgment in the Vuchar case and by the British, American and Canadian authorities upon which it is based.

APHORISMS FROM FULLER

Measure not men by Sundays without regarding what they do all the week after.

Never speak but when you have something to say. Whereupon shouldst thou run, seeing thou hast no tidings?

Associate with men of good judgment; for judgment is found in conversation, and we make another man's judgment ours by frequenting his company.

Choose such pleasures as recreate much, and cost little.

He that sips of many arts drinks of none.

Abstracts from Current Literature

Medicine

Angio-Cardiografia en el Nino. (Angiocardiography in the Child). Castellanos, A., Pereiras, R. and Garcia, A.: Presented at the Congress of the Pan-American Medical Association, *La Propagandista*, Monte 87, Havana, Cuba, 1938.

An important practical aid in the differential diagnosis of cardiac defects and of changes in the right heart chambers may be obtained through the method described here as angio-cardiography, in which the outlines of the superior cava, right chambers, cardiac septa, and pulmonary tract are defined by the injection of a radio-opaque substance immediately before roentgenography of the heart. In this communication, the authors have applied this procedure for the first time to congenital lesions in infants or children under six years with extremely interesting results. Their technique differs from that of the earlier workers in the arteriography of the pulmonary circulation, in that the radio-opaque substance is here injected into the elbow or long saphenous vein of the child, with the help of a small trocar, instead of being introduced directly into the right auricle. The material used was some 10 c.c. of a 35 per cent solution of Bayer's per-abrodil or Schering's uroselectan B in infants; in children from 4 to 6 years a larger quantity, 22 to 30 c.c. of uroselectan B was given, as this is denser and so gives better results. Carried out in this way, as described here in great detail by these authors, the procedure is said to be quite harmless. By a special contrivance of the x-ray tubes both antero-posterior and lateral pictures may be taken simultaneously.

The monograph ends with complete protocols of 9 cases with accompanying radiographs taken within 20 seconds after injection. In a tenth case, one of complete transposition of the arterial trunks, the injection was done post mortem and the diagnosis thereby established was confirmed at the subsequent autopsy.

MAUDE E. ABBOTT

Tuberculosis in Hospital Workers: A Summary of Canadian Data. Macklin, M. T.: *Tubercle*, 1938, 19: 193.

The information contained in this paper was obtained from the answers to a questionnaire sent to all tuberculosis hospitals and sanatoria in Canada, three-fourths of whom answered. In all hospitals it is the rule either to tuberculin-test the nurses entering service and to x-ray the positive reactors, or to take skiagrams of the chests of all entrants into the nursing service as a routine. The negative reactors are tested usually at three-month intervals until they show a positive reaction, at which time they are

x-rayed. Skiagrams are taken of all positive reactors at yearly intervals or oftener if there is any indication of a beginning chest lesion. Two-thirds of the hospitals prefer positive reactors and about one-fourth of them will accept only positive reactors. Some have to accept negative reactors because of the high incidence of negative reactors among their applicants especially in areas in which the nursing personnel is drawn from rural districts. About one-third felt there was no disadvantage to the nurse in being a negative reactor. Figures drawn from the nursing service of the mental hospitals of Ontario though small, suggest that the negative reacting nurse is apt to develop lesions in greater proportions than is the positive reactor. Most of the sanatoria accept graduate nurses only, or in such proportion that most of the staff are graduates. The nurses in the general hospitals with tuberculosis sections are mostly undergraduates. Most directors felt that raising the age at which nurses are accepted for tuberculosis work to 28 or 30 would lower the incidence of the disease among nurses. The incidence of tuberculosis in nurses in general hospitals is higher than in the sanatoria.

These data were presented before the British Medical Association at its annual meeting in Belfast, July 21, 1937. In the discussion which followed, it was remarked that Canada appeared to be ahead of England in the care taken in choosing girls for training, in the conditions under which nurses worked and were looked after if they broke down with tuberculosis. (*Brit. M. J.*, 1937, 2: 239).

CHARLES C. MACKLIN

Gonococcic Endocarditis—12 cases with 10 Post Mortem Examinations. Williams, R. H.: *Arch. Int. Med.*, 1938, 61: 26.

This condition occurs more frequently than is usually thought, at an average age of 36 in the series studied. The interval between primary infection and development of acute gonococcal endocarditis showed great variation—3 weeks to 14 years. Arthritis, gonococcal in form, is usually present with the endocarditis, at first multiple, but finally settling in one joint as an acute inflammation. About half the cases showed embolic petechiæ, a small percentage arterial embolism in brain or leg. Embolic nephritis is frequently found. Recognition of these embolisms is a great aid in diagnosis.

The course is usually marked by frequent chills, "double peak" temperature fluctuations, and great fluctuations in temperature, as much as 8 to 10 degrees. Examination of the heart usually shows definite murmurs, mostly mitral or aortic, and daily observation will discover changes in the murmurs which indicate the progress of the disease in the valves themselves. Electrocardiograms agreed with the clinical picture except that in two cases where they were

negative, gonococci were found in culture in most of the cases and were recovered from the valve lesions or joints in a good many.

The difference between this condition and gonococœmia is that in the latter the chills are less severe, temperature fluctuations less marked, and embolism is almost always absent so that the patients usually recover. In gonococcal endocarditis few, if any, recover; the cause of death is frequently acute (embolic) nephritis. These cases are not easy to diagnose, requiring careful study and observation.

P. M. MACDONNELL

Surgery

Some Surgical Aspects of Tuberculous Disease of the Abdominal Lymphatic Glands. Colt, G. H. and Clark, G. N.: *Surg., Gyn. & Obst.*, 1937, 65: 771.

The authors report on some 239 cases. Primary infections are usually bovine, whilst secondary (two foci in the body) are usually human. In 172 cases affecting the mesenteric nodes chronic inflammation was found in the vermiform appendix in 52 per cent, with a distally atrophic appendix in an added 13 per cent. The authors believe that in all their cases the tubercle bacillus entered the lymph channels *via* the unbroken mucosa; all patients with ulcerated mucosa do not live a sufficient period to allow for calcification. Klotz' theory of calcium soap and Well's theory of physico-chemical formation are given equal credence in the deposition of calcium. Calcification probably occurs from 6 to 12 months after infection. Calcified lymph nodes may become free in the peritoneal cavity. Calcareous nodes may give rise to a recurrent type of intense, colicky pain, usually centrally placed; the caseous node, more often a dull ache. Both are relieved by heat and rest. Acute and subacute small bowel obstruction from the calcareous node and from adhesions, which were found in 25 per cent of this series, may necessitate resection or enterostomy as a preliminary operative measure. Axial rotation in an anti-clockwise direction along the ileocolic artery and volvulus have occurred. The authors used a paramedian incision and removed all the lymph nodes possible as a routine measure. A detailed technique is given. In 5 cases tuberculosis was stirred up elsewhere.

FRANK DORRANCE

Pathogenesis of Anal Fissure and Implications as to Treatment. Blaisdell, P. C.: *Surg., Gyn. & Obst.*, 1937, 65: 672.

Hypothecating anal fissure as a clinical entity unassociated with any other anal disease is plausible because of the separate and distinct location, the 6 and 12 (clock) positions. Blaisdell states that anal fissures seldom, if ever, extend more cephalad than the intermuscular septum separating the subcutaneous fibres from

the superficial fibres of sphincter ani externus. The subcutaneous fibres cause a "raised bar effect" whose anterior surface is more anterior than the plane of the deep and superficial fibres of the external anal sphincter; it is the skin overlying this bar which is the site of anal fissure. Severance of this muscle bar with a wedge-shaped incision and the use of a light pack of vaseline gauze for several days, to allow healing to proceed from the base, is the logical manner of treatment. The factor of non-recurrence is to be taken as the real criterion of successful management and not the fact of healed operative wound.

FRANK DORRANCE

ABSTRACTOR'S NOTE.—Gray's Anatomy does not concede 3 distinct lobulate divisions of the external sphincter of the anus. It concedes the superficial and deep fibres and corrugator cutis ani. It is presumably to the last named muscular fibres that Blaisdell refers. (Gray's Anatomy), 1935, B.R. Terminology.

Congenital Umbilical Hernia. Jarcho, J.: *Surg., Gyn. & Obst.*, 1937, 65: 593.

This condition is more properly called an eventration; the contents have never occupied the abdominal cavity. One case in which the liver occupied the sac is cited, with the details of operative cure. Operation was performed within 12 hours after birth.

The author quotes Berglas, who states there are two types of umbilical hernia in which early operation is necessary; one has an avascular sac which covers the divergently coursing umbilical vessels; the other has peritoneum as its sac. The first is the commoner and the more dangerous. In both types the sac dries readily, with the probabilities of rupture, infection and death. He considers that a marked disturbance between the growth process of the abdominal cavity and the abdominal contents is primarily the fault (third to tenth week); the other contributory factors are hyperlordosis of the spinal column and anomalies of the mesenteries (ventral and dorsal). The small and large intestine are the more common occupants, but any abdominal viscera may be present. In the case of the liver he hypothecates a laxity of the supporting ligaments. Heredity, pathological persistence of the vitelline duct and defects of the abdominal wall are not accepted as plausible factors of causation.

With the every-day variety of small umbilical hernias not containing an abdominal viscera adhesive plaster repeatedly applied is always successful.

FRANK DORRANCE

Obstetrics and Gynæcology

The Prevention of Eclampsia. De Snoo, K.: *Am. J. Obst. & Gyn.*, 1937, 34: 911.

It is probable that the last cause of the defective functioning of kidneys and liver and also of the eclamptic attack is due to vasomotor cramp and the resulting defective circulation. A "cramp centre" is predicated.

There is practically no difference between the Na content of the blood, in gravidas and non-gravidas and in normal and toxæmic women with normally salted food. On a salt-free diet invariably the Na content diminishes, as well in normal gravidas as in toxæmic ones, on an average of 5 per cent. In eclampsia the Na content in most cases is approximately normal, but in other case abnormally high, up to 370 mg. and more. The influence of the salt-free diet on the chlorine content is about the same as on the Na content. The calcium and potassium content on the contrary do not change.

De Snoo allows his pregnant patients to eat any food they like except milk, but all without salt, and an additional litre or two of water. It is his firm belief that salt is the culprit and that it is to blame not merely for the eclampsia but partly also for the toxæmia. It would be well if the women were to be forbidden the use of salt in the second half of their pregnancy.

The figure for eclampsia may still be reduced, and this will be due in large measure to blood pressure control through pre-natal care, which hardly ever fails to give timely warning, and to the salt-free diet.

ROSS MITCHELL

Pregnancy Complicated by Ovarian and Par-ovarian Tumours. Wilson, K. M.: *Am. J. Obst. & Gyn.*, 1937, 34: 977.

Thirty patients with ovarian and parovarian tumours associated with pregnancy are presented. All but two were operated upon with no maternal deaths. In 5 women, where removal of the tumour involved removal of the corpus luteum, abortion occurred in each instance. Abortion occurred in 3 other instances but the accident was apparently not attributable either to the tumour or the operation.

Torsion of the pedicle of the tumour was found to be a frequent complication, occurring in 20 per cent of the patients in the series. A tumour known to develop during the course of a pregnancy will quite probably prove to be a corpus luteum cystoma. It is suggested that when operation involves removal of the corpus luteum immediate administration of progesterone be begun.

ROSS MITCHELL

A Critical Study of 349 Cases of Breech Delivery. Macafee, C. H. G. and McClure, H. I.: *Brit. M. J.*, 1937, 2: 1112.

This study is based on a series of 349 consecutive breech deliveries occurring in the Royal Maternity Hospital, Belfast, during the years 1932-36. Of the 349 cases 305 were primary breech presentations. Provided that adequate management is available, the extension of the limbs is not regarded as a complication. The corrected fetal mortality in primiparæ is 10 per cent; in multiparæ 3.42 per cent; and in all cases 6.10 per cent. Stress is laid on the value of ante-natal version, but external version should

be performed with the greatest gentleness. The Trendelenburg position is of great assistance. The authors describe their method of dealing with the anterior arm. Slow and gentle delivery of the after-coming head is insisted upon to prevent tentorial tears. Breech delivery leads to increased rest to the mother from puerperal sepsis.

ROSS MITCHELL

Vitamin E in the Treatment of Habitual Abortion. Currie, D.: *Brit. M. J.*, 1937, 2: 1218.

In vitamin E we appear to have a means of treating a most distressing condition with some hope of success. Up to the present the amount of vitamin and the length of time it should be administered are open to discussion, but until further observations are made it would appear safer to give it throughout the whole of pregnancy in a dose of not less than three minims of wheat germ oil daily.

ROSS MITCHELL

Erythroblastosis Fetalis as a Cause of Infantile Mortality. Javert, C. T.: *Am. J. Obst. & Gyn.*, 1937, 34: 1042.

Erythroblastosis runs part of its course *in utero*, and its presence may be suspected before delivery. Typically, the mother is a multipara who has made a poor gain in weight during pregnancy, and who gives a history of familial jaundice. Hydramnios may be present with diminished or absent fetal activity. Fetal distress may occur. The amber-coloured fluid when the membranes rupture is important. Analgesics and anæsthetics during delivery are contraindicated. The diagnosis is established after delivery by the deep yellow vernix, or the presence of hydrops, and the presence of erythroblasts in the blood smear and in the fetal capillaries of the placenta. The Wassermann reaction is negative. The incidence of erythroblastosis at the Woman's Clinic of Cornell University Medical College in 1936 was 1 in 400 infants. Resuscitation was necessary in 50 per cent of infants with erythroblastosis. The average red cell count was 3,400,000 per c.mm. and the average hæmoglobin 51 per cent. The mortality was 70 per cent. The treatment was repeated blood transfusions. Within two weeks the nucleated red cells had disappeared.

ROSS MITCHELL

Ophthalmology

On Ocular Pemphigus. Kapuscinski, W. J.: *Ann. d'Ocul.*, 1937, 174: 451.

Ocular pemphigus usually follows pemphigus of the skin, and usually begins at the same time as pemphigus of other mucosæ, particularly buccal and pharyngeal. However it sometimes shows itself as an apparently primary ocular affection.

Four cases are detailed, and are of interest because of the complete clinical picture. The

author concludes that ocular pemphigus is a disease characterized by primary degeneration of the mucosa of the conjunctiva, especially the epithelium. The pathological processes in the cornea are limited to the superficial layer, and may be similar to the changes that take place in the conjunctiva. This chronic inflammatory condition is characterized by a cellular infiltration and is purely a secondary phenomenon which is caused by the invasion by microbes of tissue already pathologically altered by pemphigus degeneration. The article has fifteen illustrative figures and a bibliography.

S. HANFORD MCKEE

The Syndrome of Direct Compression of the Intracranial Optic Nerve. Desvignes, P.: *Ann. d'Ocul.*, 1937, 174: 290.

As indicated by the title this article deals with cases where the optic nerve has been pressed upon by tumour formation, either fibrous or vascular, in the part of the optic nerve just in front of the chiasm. The optic nerve in this part is fixed by its continuity with the chiasm and by the optic canal and the arteries of this region, ophthalmic, outside and below, the cerebral anterior and communicating anteriorly, above. In such a position it cannot escape from pressure as it might do in the orbit where the nerve is surrounded by soft tissue. The result therefore follows that if a tumour begins in this neighbourhood the nerve will soon be compressed and ocular signs will first draw attention to the condition.

The signs of compression of the chiasm are well known, but those of the optic nerve have not been as much studied. In some cases study has placed the diagnosis of a cerebral tumour localized near the optic nerve, and in such cases, if operation has not been too long delayed, patients have escaped rapid blindness and death with great suffering.

The author gives first a historical review of the subject followed by first, clinical signs: (1) vision; (2) visual fields; (3) appearance of the fundus; (4) other ocular symptoms. There is a bibliography.

S. HANFORD MCKEE

Contact Glasses. Bruce, M. G.: *Am. J. Ophth.*, 1937, 20: 605.

The idea of contact glasses occurred first to the younger Herschel, astronomer and physicist, about 1827. Details of his experiments are lacking, but he apparently took gelatine casts of the eye and made from these a gelatine meniscus. It was not until 1911 that Zeiss produced the first ground contact glass, followed in 1912 by a similar glass for use in cases of conical cornea. In 1914, three years after the production of the first ground contact glass, Erggelet suggested their use for aphakia, and later Siegrist advised them for keratoconus, and in 1929

Deutsch called attention to their value in irregular astigmatism. From that date there has been a constantly increasing interest in the subject, which has been stimulated by articles in medical journals and even in the lay press.

The use of contact glasses in overcoming refractive errors is confined largely to myopia. Other suggestions for their use are in the treatment of neuromyolytic keratitis, pemphigus, lagophthalmos. One of the most frequently mentioned disadvantages to their use is the difficulty of inserting them. A very real disadvantage however lies in the wide difference in individual tolerance; also their high price should be borne in mind.

S. HANFORD MCKEE

Neurology and Psychiatry

Sex-linked Microphthalmia Sometimes Associated with Mental Deficiency. Roberts, J. A. F.: *Brit. M. J.*, 1937, 2: 1213.

In 1922, Ash reported a family in which blindness caused by abnormally small eyeballs was inherited according to the same rules of transmission as are colour-blindness and hæmophilia; namely, it affected males in the families and was transmitted to them by their unaffected mothers. Roberts brings this family history up to date, and reports that in the majority of cases the blindness was associated with mental deficiency. The history runs through four and possibly six generations. In the first generation in which the information was definite there were 5 sisters and 3 brothers. Two of the latter were microphthalmic, and one was definitely mentally deficient; he died at the age of 47. His normal twin sister had 12 children of whom 2 boys were blind. Nothing is stated as to their mentality. Two of the 12 children whose history is known were girls, both of whom had affected sons. One girl had 4 sons, 2 of whom were blind, and 1 was at the level of imbecility, the other, of complete idiocy. The other girl had 9 children, 7 of them boys. Four were blind. One of the blind boys was dead, one was feeble-minded, one was an imbecile, and one was definitely above average intelligence.

One of the sisters in the first generation had 2 normal boys and 3 girls. One of the latter had 3 sons affected with blindness and 1 normal daughter, who, in turn, had a blind son mentally normal. The 3 brothers who were blind died at 5 (this one in an epileptic fit, although he was said to be mentally normal), at 18, and at 14, respectively. The last two were idiots and epileptic. Thus in the four generations there were 2 in the first, 2 in the second, 9 in the third and 1 in the fourth who were blind, and 8 of these were definitely known to be mentally defective. None of the members not blind showed any mental defect. This family is unusual in that the microphthalmia is sex-linked, and in that it was so frequently associated with

such marked degrees of mental deficiency, suggesting that in some cases the development defect involved far more of the nervous system than the eye alone.

MADGE THURLOW MACKLIN

Therapeutics

Thrombophlebitis of Varicose Veins. Edwards, E. A.: *Surg., Gyn. & Obst.*, 1938, 66: 236.

The author, after active surgical intervention in 63 cases of acute thrombophlebitis in varicose veins, and after biopsy examinations of thrombophlebitic lesions, undertakes a critical analysis of the present conservative treatment of phlebitis. He was unable to find bacteria in the thrombi by stain or culture, unable to find acute inflammatory reaction in the wall of the veins, in the lung after infarction from the thrombotic veins or the development of sepsis after operative procedures. He believes the thrombogenic factors (1) slowing of the blood flow; (2) physical and chemical changes in the retarded and retrograde blood flow; (3) changes in the intima are entirely responsible for the proximal extension, the involvement of perforating and deep veins, and the crippling of the valves, and that ambulatory treatment with elastic bandage support decreases rather than increases the frequency of embolism. Recanalization of firm thrombi is the rule rather than the exception. He advises ligation at the saphenofemoral junction except in those cases of migratory phlebitis which often are an expression of Buerger's disease. The varices can be injected with a 0.5 c.c. injection of 5 per cent sodium morrhuate when the inflammatory reaction has lessened, or ligation of the perforating veins may be performed. The phlebitis usually subsided in these 63 cases within a week; no untoward results prevented return to work within 3 weeks. The cases have been followed from a few months to 5 years without recurrence.

FRANK DORRANCE

Anæsthesia

The Intravenous Use of Morphine Sulphate for Analgesia. Betlach, C. J.: *Proc. Staff Meetings of Mayo Clinic*, 1937, 12: 733.

Morphine sulphate has been used therapeutically for 135 years but it has been only since 1930 that it has been employed intravenously. In Europe it has been administered in this manner for pre-operative medication, for diagnostic purposes and as a therapeutic drug. In America, Dr. Salzer, of Cincinnati, has reported on its intravenous use for gall-bladder colic, angina pectoris, etc.

The effect of the drug given intravenously is more pronounced and comes on immediately as compared with the more delayed action of the subcutaneous injection. The effect lasts about as long as that following subcutaneous injection.

Patients vary in their reaction to the intravenous administration, some complaining of dizziness, tinnitus, tachycardia and a feeling of warmth. Vomiting is less frequent following this technique.

The method used is as follows. A tablet of morphine sulphate, gr. 1/6 or gr. 1/4, is dissolved in 1.5 or 2 c.c. of sterile water, respectively. This is put in a 2 c.c. hypodermic syringe and a 20 or 22 gauge intravenous needle is attached. After venipuncture the drug is administered very slowly. About 1/24 gr., or 0.25 to 0.33 c.c. of solution, is injected first and twenty to thirty seconds are allowed to elapse. This is to allow for any idiosyncrasy to appear. The remainder of the drug is then injected slowly until the desired effect is obtained.

Intravenous injection of morphine sulphate finds a valuable use in supplementing a waning spinal anæsthetic. Here the injection of 1/6 gr. of morphine will often enable the surgeon to complete his work without resort to supplementary anæsthesia. It is useful as pre-operative medication for regional and local anæsthesia. Traumatic pain and visceral colic respond more rapidly to this method than any other means of administering morphine.

The advantages of the intravenous method over the subcutaneous are: (1) the full analgesic effects are obtained immediately; (2) the drug can be given at the moment it is needed; (3) the dose may be regulated accurately.

F. ARTHUR H. WILKINSON

Obituaries

Dr. Norman Anderson, of Toronto, died on February 17, 1938. He was a graduate of Trinity University, Toronto (1892).

Dr. John Charles Bell, of Merlin, Ont., died on February 9, 1938, in his eighty-first year. He was a graduate of Trinity University, Toronto (1884), and L.S.A. Lond. (1886). He was at one time M.O.H. for the Township of Raleigh.

Dr. Gordon Elliott Booth, of Ottawa, died on March 6, 1938. He was fifty-three years old.

Dr. Booth was born at Waterloo, Que., and graduated from McGill University (1910). He went from there to Manhattan Maternity Hospital, New York, for a post-graduate course. He was attached to the medical and genito-urinary departments of the Ottawa Civic Hospital.

Dr. Joseph Georges Albert Bouvier, of St. Albert, Ont., died on February 12, 1938. He was born in 1882 and a graduate of Laval University, Montreal (1908).

Dr. Joseph Ernest Champagne, of Hull, Que., died on January 25, 1938, aged fifty-seven.

Dr. Champagne was born at St. Norbert, Berthier County, Que., the son of Joseph Aimé Champagne and the late Mrs. Champagne, formerly Miss Esther Marseille. He completed his education in Montreal, where he graduated with his medical degree from Laval University (1907).

Dr. Frank Coleman, of Hamilton, Ont., died on February 8, 1938, in his seventieth year. He was a graduate of the University of Toronto (1894).

Dr. Joseph Aloysius Corcoran, of Montreal, died on March 13, 1938.

Dr. Corcoran was former professor of chemistry at Loyola College, and was born in Stratford in 1878. He was educated at Parkdale College, Toronto, and graduated from Laval University, Quebec, with his B.A. degree, subsequently graduating in medicine at Trinity University, Toronto (1898).

Dr. Riel Hillier, of Leamington, Ont., died on January 19, 1938, aged seventy-three. He was a graduate of Victoria University (1886). He was born at Bath, Ont., on November 5, 1866, of Scotch U.E.L. parentage. He was a veteran of the North-West Rebellion and the Great War where he served with distinction as a combatant officer.

Dr. Daniel H. McCalman, of Winnipeg, died suddenly on March 5, 1938, leaving behind him a record of a singularly active and useful life. For the last few years his health had been indifferent, but apparently he had improved, and on February 1st he was present at the annual meeting of the Sanatorium Board of Manitoba and took part in the discussion.

Dr. McCalman was born near Barrie, Ont., in 1861 and came to Manitoba in 1880. He taught school in Emerson and then graduated in Arts from St. John's College, Winnipeg. He attended Normal School and in 1887 became School Inspector. Eight years later he entered the Manitoba Medical College where he had a brilliant academic career. In 1902 he became Professor of Hygiene in Manitoba College, in 1905 Lecturer in Obstetrics, and in 1907 Professor of Obstetrics, a post which he held for twenty years, then becoming Professor-emeritus. In 1905 he was appointed Obstetrician to the Winnipeg General Hospital and resigned in 1922 when he was appointed a member of the Honorary Consulting Staff.

With his friends Dr. Gordon Bell and Dr. E. W. Montgomery, Dr. McCalman took a keen interest in public health matters and in 1923 he became chairman of the Manitoba Board of Health, with which he was long associated. He was a Past President of Manitoba College of Physicians and Surgeons and a Trustee of the Gordon Bell Memorial Fund. He became a member of the Sanatorium Board of Manitoba in 1930.

His keen mind, singleness of purpose, and devotion to duty made him a very valuable member of the medical profession, both as a teacher and administrator.

Dr. Samuel Russell McCreary, of Belleville, Ont., died on January 28, 1938. He was born in 1893, and a graduate of McGill University (1919).

Dr. Joseph Churchill Patton, of Toronto, Ont., died on February 7, 1938, in his eighty-eighth year. He was a graduate of Victoria University, Cobourg (1888).

Dr. Herbert Henderson Sinclair, of Walkerton, Ont., died on February 1, 1938, in his sixty-ninth year. He was a graduate of the University of Toronto (1894).

Earth is an island ported round with fears;
Thy way to heaven is through the sea of tears.
It is a stormy passage, where is found
The wreck of many a ship, but no man drowned.

—Francis Quarles, Epigram 8.

News Items

Alberta

The Alberta Government is making estimates for another Health Unit to be established in 1938, though none was established in 1937, notwithstanding that an amount was placed in last year's budget for it. The sum of \$20,500.00 was provided for the care of those afflicted with poliomyelitis, in the hope that the Government assuming the responsibility both for prevention and cure, better results will be obtained.

Since the Government assumed responsibility for prevention and care of those afflicted with the above disease, the costs naturally have mounted. The following figures will indicate the problem.

Government estimates for tuberculosis work, 1933-34, \$175,390.00.

Government (full responsibility), 1936-37, \$278,618.00.

Government (full responsibility), 1937-38, \$333,865.00.

Government (full responsibility), 1938-39, \$370,904.00.

Thus the amount has doubled since the Government's assumption of what is called full responsibility, though nothing is being assumed regarding tuberculosis of bone.

The Workmen's Compensation Act is being revised, and the officers were planning to have a finality to certain compensation claims, like final settlements with insurance companies. The men, however, will have none of this arrangement. The workmen desire an appeal from the decision of the physician in charge of the case, to an Appeal Board of Physicians, but if the decision of this Board is not accepted by the injured workman he wants the right to go before a Lay Appeal Board composed of three men, as follows. The Attorney-General of the Province, a man chosen by the workman, a man chosen by the industry. Nor is the workman willing to be bound by the decision of this Appeal Board; he wants a further appeal to the Workmen's Compensation Board itself.

Chiropractors are demanding that their cult be named in the Bill, indicating that their system of healing be legally recognized in Alberta, and should be put on an equal footing with the medical profession. They are asking for four chiropractic referees, and that the workmen have the right to call a chiropractor at the initial stage, and the Board have no power to change the treatment.

Amendments are being made to the Act with the object of restricting the sale of codeine and sulfanilamide and their salts. The poison list is being amended by including with potassium cyanide all other metallic cyanides.

The annual banquet of the Calgary Medical Society was held at the Renfrew Club on February 8, 1938. The President, Dr. A. I. Danks, was Chairman. The address of the evening was given by Major Donald Cameron, Librarian of the University of Alberta. Other speakers were Mayor Andrew Davison, Dr. C. R. Bunn, of Red Deer, President-elect of the Canadian Medical Association—Alberta Division; Dr. W. L. Williamson, representing the Edmonton Academy of Medicine; Dr. R. R. McIntyre, the Calgary Dental Society. A pleasing feature was the presentation of illustrated addresses to Dr. W. A. Lincoln and Dr. A. B. Singleton for the splendid services they have given the city on the City Council and the Public School Board. Dr. Euston Sisley, who has been in active practice in Calgary for the past thirty-four years, was made a life member of the Society. Dr. E. B. Roach made the presentations.

G. E. LEARMONTH

British Columbia

In a speech before the Vancouver Institute in February, the Hon. G. M. Weir, Minister of Education, stated that he wished to see an institute of preventive medicine established in connection with the University of British Columbia in the near future.

The Prince Rupert Hospital Board has called for tenders for the proposed new \$100,000.00 hospital unit. The plans and specifications have been received from the provincial architect, and call for a three-storey reinforced concrete building, fireproof, and fully modern.

Directors of the Chilliwack Hospital Board are seeking a provincial grant toward a proposed new \$80,000.00 hospital building.

At the annual meeting held recently it was announced to the directors of the Kelowna Hospital Society that a new wing for the Kelowna General Hospital, costing from \$50,000.00 to \$100,000.00 was immediately necessary.

The Vancouver Municipal Chapter, Imperial Order Daughters of the Empire, has presented a bronchoscopic room fully equipped to the Vancouver General Hospital in commemoration of the Coronation of their present Majesties. This represents a contribution of \$2,500.00.

Dr. Allon Peebles, chairman of the at present non-functioning British Columbia Health Insurance Commission, has left for a three months' European tour. He will visit England, Scotland, France, Germany, Denmark and Norway, all of which countries are stated to have health insurance systems in operation, in order to make a first-hand study of European health insurance.

The British Columbia and Alberta divisions of the Canadian Association of Radiologists met in Victoria on February 4th and 5th. It is hoped that this may become the first of a series of annual conferences to be held alternately in the two provinces.

Wm. H. Walsh, hospital consultant architect of Chicago, has been invited by the Board of the Vancouver General Hospital to come to Vancouver to confer with Mr. Whittaker, the provincial architect, on plans for a new building for acute cases. D. E. H. CLEVELAND

Manitoba

The Rockefeller Foundation has agreed to make a large contribution to initiate a survey into general morbidity statistics in the municipalities having municipal doctors. The area covered is rural, with an approximate population of 15,000 and containing groups of various national origins. The survey will be carried out over a two-year period. It is proposed to use statistic forms similar to those in use in collecting data in connection with the medical care of the unemployed in the City of Winnipeg, and a similar method of computing the figures by means of the Hollerith system will be adopted.

In conjunction with this study of illness a study of all pregnancies in Manitoba during the course of a year will be carried on simultaneously by the same personnel. Material for this study will be obtained by the use of forms to be completed by the attending physician. The organization is to consist of a special medical officer with statistical knowledge, two public health nurses, one with statistical knowledge, and an office clerk. The direction of the study is to be under the Department of Health and Public Welfare of the province. The Dominion Department of Pensions and National Health has agreed to make a contribution towards defraying the costs of this survey. The co-

operation in this survey by the Manitoba Medical Association is to be considered merely as insurance against the initiation of some form of state health insurance passed on inadequate knowledge.

When this survey is completed there will then be available information with regard to morbidity statistics among a large urban population in Winnipeg in connection with medical care of the unemployed which has been carried on since 1934, and also among representative medical groups and statistics as to maternity in the province together with the valuable mortality statistics. These should form a valuable body of medical statistics.

At a special convocation of the University of Manitoba held in the Concert Hall of the Winnipeg Auditorium the honorary degree of Doctor of Laws *honoris causa* was conferred on Elmer Verner McCallum, Ph.D., Sc.D., Professor of Biochemistry, School of Hygiene and Public Health of the Johns Hopkins University. Dr. McCallum delivered the Gordon Bell Memorial Lecture, on "Some Practical Applications of Nutrition".

Winnipeg General Hospital is advertising for applications for the position of Assistant Gynaecologist and Assistant Oto-laryngologist.

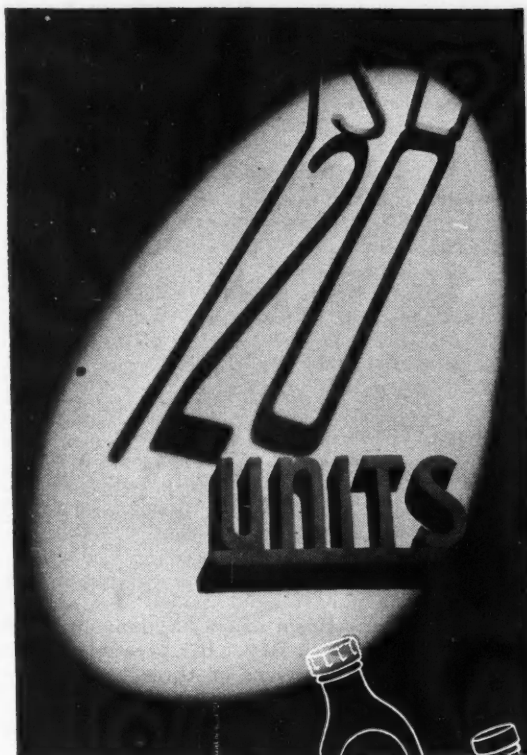
A meeting of the Sanatorium Board of Manitoba was held at the St. Boniface Sanatorium on March 11th. Dr. J. D. Adamson, Superintendent of St. Boniface Sanatorium, reviewed the work of the past year.

The institution has been run to almost full occupancy as regards adults and about 60 per cent occupancy for children. The average length of stay for all cases was 288 days; for cases of pulmonary tuberculosis 320 days. It was noted that the percentage of far-advanced cases among males was higher than for females, 73 per cent as against 65 per cent. The table showing the age on admission demonstrated the comparative incidence of pulmonary tuberculosis before the age of fifteen and its very heavy incidence between 20 to 35 years, especially in females. During the 5 to 15 age-period there is very little pulmonary tuberculosis that requires treatment, but the incidence of bone tuberculosis is highest during this period. Females show preponderance before the age of 35 and a gradual decreasing preponderance thereafter. These facts on age-incidence indicate that main efforts should be directed to adolescents and in adults rather than to children. In young adolescents tuberculosis is more than twice as common among females but at the age of 50 or over it is more than four times as common among males.

In the St. Boniface Sanatorium surgical methods are being extensively used for treatment. Nearly 64 per cent of cases received surgical treatment. One hundred and fifty major surgical operations on tuberculous patients were done with only one death during the year. In connection with the Sanatorium there is a Respiratory Clinic at St. Boniface Hospital with an interlocking staff. This outpatient clinic is a great assistance to the Sanatorium.

Since the opening of the Central Tuberculosis Clinic in Winnipeg and the St. Boniface Sanatorium the death rate from tuberculosis in Winnipeg has declined considerably, from an average of about 55 per hundred thousand during the years 1924 to 1929 to 30 per hundred thousand during 1936.

Headed by Dean A. T. Mathers, 29 members of the Faculty of Medicine, University of Manitoba, left Winnipeg on February 26th for Chicago. The purpose of the visit was to confer with heads of departments in the Faculty of Medicine of the University of



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MONTREAL

CANADA

Chicago. The majority of the party returned on March 3rd feeling that the visit had been most profitable.

The visit of Dr. Fulton Risdon, of Toronto, as guest speaker at the post-graduate course in Traumatic Surgery was greatly enjoyed.

ROSS MITCHELL

New Brunswick

Captain Charles McMillan, R.C.A.M.C., has been transferred from the general list to Command No. 7, Hygiene Section.

Justice J. H. L. Fairweather, of Saint John, has consented to become the Chairman of the New Brunswick Branch of the Canadian Society for the Control of Cancer. Organization of this provincial branch is coming forward under a select committee.

Dr. J. K. Sullivan was the speaker at the monthly meeting of the Saint John Medical Society on March 2nd. Dr. Sullivan discussed a wide field of renal and ureteral diseases. The attendance was satisfactory, and his presentation of lantern slides, demonstrating the various lesions described, was much appreciated.

Dr. E. C. Menzies, Superintendent of the Provincial Hospital, appeared before the Fredericton Medical Society at their monthly meeting in February and spoke on the subject of "The early mental case in general practice".

Dr. D. C. Malcolm, of the surgical staff of the Saint John General Hospital, has been confined to hospital for some time, suffering from a severe infection of the face.

Two delegations from the New Brunswick Medical Society have recently appeared before the Provincial Government in protest against restrictive regulations issued by the Workmen's Compensation Board. These regulations limited the hospitalization of certain types of injuries to a degree that disallowed the judgment of the physician in charge of the case. The reception of these committees by the Government resulted in satisfactory arrangements being made.

The New Brunswick Medical Society has decided to eliminate their scientific sessions from their annual meeting for the year 1938, so as to allow their members more freedom to attend the meeting of the Canadian Medical Association in Halifax. Their business meeting will be held in September at Edmundston, and will occupy only one day.

The reports of the local boards of health mark a very definite decrease in the amount of infectious diseases reported during the first two months in 1938, as compared with the same period in 1937.

It is anticipated that in the very near future very extensive repairs and additions will be made to the Saint John Tuberculosis Hospital, which for some time has been filled to capacity, necessitating the creation of a waiting list of recommended patients to this institution.

A. STANLEY KIRKLAND

Nova Scotia

In the speech from the throne at the opening of the Nova Scotia Legislature it was brought out that the health of the province had been well maintained through 1937, there being no serious outbreaks of disease and no severe epidemics. Of particular interest, it was said, was the formation of a health unit for Cape Breton Island. An annex for the tuberculous

was erected in connection with the Amherst Hospital and the government felt "that in local communities the extension of the Annex principle will be of great assistance in dealing with tuberculosis." The total number of deaths from tuberculosis was reported as being reduced during 1937.

At the annual meeting of the staff of the Halifax Infirmary, Dr. W. G. Colwell was elected president, Dr. F. S. Findlay, vice-president, and Dr. C. M. Jones, secretary.

Dr. G. A. MacIntosh, Superintendent of the Victoria General Hospital, Halifax, has gone to Florida for a vacation and well earned rest. His post at the hospital is being taken by Dr. H. L. Scammell, of the Workmen's Compensation Board.

The freighter, *City of Auckland*, docked at Halifax from Calcutta with a case of small pox on board, and kept port physicians busy vaccinating both the crew and dock attendants who came in contact with the ship.

Dr. H. R. Corbett, late roentgenologist to the Kentville Sanatorium, has taken up his new appointment to St. Rita's Hospital in Sydney and St. Joseph's Hospital in Glace Bay. His presence will be a great adjunct to the services of these hospitals.

Dr. Hugh Martin has been appointed town health officer for Sydney Mines.

More than 6,500 persons were treated at the Dalhousie Health Centre during 1937. This clinic has been growing from year to year since its inception, and this latest figure represents a substantial increase over that of the previous year.

Dalhousie University will add to its buildings a new medico-dental library before the beginning of next term. Already the University has had expert advice from outstanding medical librarians of this continent. Plans have been drawn and it is expected that the corner stone will be laid this month. The new library will cost somewhere in the vicinity of \$100,000.00 and will fill a much needed want, not only among medical and dental students of Dalhousie but among physicians of Halifax and Nova Scotia as well.

ARTHUR L. MURPHY

Ontario

The Committee in charge of the McGibbon Memorial Fund which is being raised to perpetuate the name of Doctor Peter McGibbon, physician, parliamentarian, and soldier, in connection with the Bracebridge General Hospital, reports that to date the fund stands at about \$5,000.00. With the amount asked for well in sight, tenders are now being called for by the Bracebridge Branch of the Red Cross Society for the construction of a new wing for the hospital and the installation of an elevator sufficiently large to accommodate a stretcher and an attendant.

Dr. Charles W. Clark, who celebrated his 93rd birthday in February, is probably the oldest medical practitioner in Toronto. Doctor Clark was born at Ingersoll, and was, for some time, in practice in Winnipeg. He is still quite active.

The Academy of Medicine, Toronto, have under preparation a special number of the *Academy Bulletin* to mark the 50th anniversary of the Ontario Medical Library Association. The Ontario Medical Library Association was one of the four medical societies which merged thirty years ago to form the Academy



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of Medicine, Toronto. The library, at that time, consisted of from 4,000 to 5,000 volumes. In thirty years, it has grown to nearly 28,000 volumes.

New legislation of interest to physicians is announced by the Honourable Minister of Health. He proposes:

1. An amendment to the Private Hospitals Act prohibiting the use of the word "hospital" by any institution that is not of a standard approved by the Department, in fact, any private institution that is not licensed under the Act. "Rest Homes" unless so licensed by the Department may no longer call themselves hospitals or private hospitals.

2. Another bill introduced by the Minister is in the form of an amendment to the Nurses Registration Act. This will bring all training of nurses under the direct supervision of the Minister of Health. No training school may be established in the province without specific approval of the Minister.

3. Another measure introduced by the Honourable Mr. Kirby extends the provisions of the War Veterans Act which provides for the burial of indigent veterans. This will now include veterans of air service as well as military and naval veterans; also veterans of all wars instead of only those of the Great War.

On the evening of February 23rd, the Ontario County Medical Society presented four of their members with Life Memberships, Dr. D. S. Hoig, Dr. T. E. Kaiser, Dr. C. F. McGillivray and Dr. D. Archer. All of these men have been prominent in the medical and civic life of Ontario County for from forty to fifty years or more. Doctor McGillivray was for two years President of the Ontario (provincial) Medical Association.

Doctor William Boyd, Professor of Pathology, University of Toronto, lectured before a large audience in Convocation Hall on Saturday, February 26th, on the subject of "Cancer".

Owing to increased demands being made upon the laboratory of the Provincial Department of Health the Deputy Minister has asked that a new laboratory be built on the site now occupied by the Ontario Hospital, Queen Street West. At present, the work is being carried on in the Whitney Block of the Parliament Buildings.

There was an unusually large attendance at the annual dinner of the Ottawa Medico-Chirurgical Society on Thursday, February 17th at the Royal Ottawa Golf Club. The guest speaker was Colonel A. T. Thompson. Mention was made of the special way in which the Society had been honoured in having one of its members President of the Ontario Medical Association and another President of the Canadian Medical Association during the same year.

Some years ago, Doctor H. B. Small, of Ottawa, was presented with a gold-headed cane by the Ottawa Medico-Chirurgical Society on the golden anniversary of his admittance to the practice of medicine. In the eight years since this replicas have been given to other physicians attaining the same distinction. Doctor Small has returned the cane and, in future, it will be hung in the hospital with which the recipient is affiliated during his tenure of the distinction.

Doctor H. J. Stander, Professor of Obstetrics and Gynaecology, at Cornell University Medical College, New York, lectured before the annual meeting of District No. 11 of the Ontario Medical Association at the Academy of Medicine on March 1st, and before a meeting of District No. 4 of the Ontario Medical Association held under the auspices of the Hamilton Academy of Medicine at McMaster University on March 2nd.

J. H. ELLIOTT

Quebec

The Montreal Convalescent Hospital reports a very successful year. A new wing is well under way, and its construction has been hastened by the promise of a grant of \$200,000 from the Provincial Government.

Statistics for the year 1937 revealed that private or semi-private patients numbered 191, public pay patients 221, patients accepted or pending under the Quebec Public Charities Act 1,051, free patients, 124. The total number of patient-days was 38,548 or an average of 24 days per patient, and the average cost per patient per day was \$1.69.

The nationalities of the patients admitted were as follows: English-Canadians, 812; French-Canadians, 128; British Isles, 387; Newfoundlanders, 19; Russians, 43; Americans, 30; Central Europeans, 94; Northern Europeans, 37; Southern Europeans, 23; Chinese, 4; Indians, 3; and Syrians, 2.

The guest-speaker at the Annual Meeting which was held on February 22nd, was Dr. W. W. Chipman, who gave a striking address. He traced the history of the hospital since its inception in 1913, and pointed out that the care of the convalescent was a special business which required a carefully selected staff with special training and experience.

The new wing, made possible, thanks to the generous aid of the Provincial Government, Sir Charles Lindsay, Mr. Herbert Molson and Mr. J. W. McConnell, adds 116 beds to the original capacity, making in all an institution of 225 beds. The hospital in the future will devote much more attention to vocational therapy. Dr. Chipman pointed out the economic gain in having a well-equipped convalescent hospital. The average cost at the Montreal Convalescent Hospital was only \$1.69 per patient per day, as compared with the \$4.00 of the general hospitals. The foundation of all care of convalescent patients, is rest, appropriate rest for mind and body; fresh air; good food; proper environment.

The International Council of Ophthalmology is a body which represents the civilized nations of the world in the domain of ophthalmology. It acts between Annual Congresses as a directing and legislative body. On the Council are two representatives from the United States and two from Great Britain and the overseas Dominions. This year it is announced that Professor Sinclair, of Edinburgh, will represent Great Britain, and we are glad to state that Prof. Fred. T. Tooke, of Montreal, will represent the latter.

Dr. B. P. Babkin, Research Professor of Physiology, McGill University, has been invited by the Board of Physiology of the University of London, England, to lecture there during the spring session. Dr. Babkin will deliver two lectures, which will be based on the researches carried out by himself and his co-workers at McGill University during the last few years. In the first lecture he will discuss "The regulation of the activity of the gastric glands" and in the second "Trophic and secretory phenomena of the digestive glands". Later he lectures in Edinburgh.

Dr. Norman Bethune, of Montreal, who organized the Spanish-American blood transfusion services in aid of the Spanish loyalists, is reported to have been in Hankow recently with the first of many combined Canadian and American units to work in the front lines with the Chinese army.

Saskatchewan

The Osler Night was celebrated by the Regina and District Medical Society with a dinner at the Hotel Saskatchewan on Wednesday, February 16th. Dr. H. E. Alexander, of Saskatoon, gave an address on the life of Osler.

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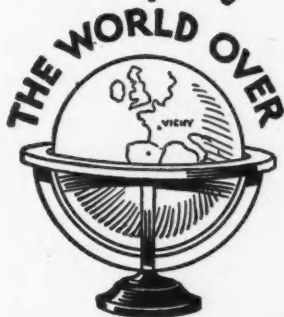


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Dr. B. Brachman, of Regina, who left here last July, received a fellowship of the St. John's Hospital Dermatological Society, with which is incorporated the London Dermatological Society, at the annual meeting held recently in London, England. LILLIAN A. CHASE

United States

The Francis Amory Septennial Prize of the American Academy of Arts and Sciences.—In compliance with the requirements of a gift under the will of the late Francis Amory of Beverly, Mass., the American Academy of Arts and Sciences announces the offer of a septennial prize for outstanding work with reference to the alleviation or cure of diseases affecting the human genital organs, to be known as the Francis Amory Septennial Prize. The gift provides a fund, the income of which may be awarded for conspicuously meritorious contributions to the field of knowledge "during the said septennial period next preceding any award thereof, through experiment, study or otherwise . . . in the diseases of the human sexual generative organs in general." The prize may be awarded to any individual or individuals for work of "extraordinary or exceptional merit" in this field.

In case there is work of a quality to warrant it, the first award will be made in 1940. The total amount of the award will exceed ten thousand dollars, and may be given in one or more awards. It rests solely within the discretion of the Academy whether an award shall be made at the end of any given seven-year period, and also whether on any occasion the prize shall be awarded to more than a single individual.

While there will be no formal nominations, and no formal essays or treatises will be required, the Committee invites suggestions, which should be made to the Amory Fund Committee, care of the American Academy of Arts and Sciences, 28 Newbury Street, Boston, Mass., U.S.A.

General

The Sixty-seventh Annual Meeting of the American Public Health Association will be held in Kansas City, Mo., October 25 to 28, 1938.

Dr. Edwin Henry Schorer, Director of the Kansas City Health Department, has been appointed Chairman of the Local Committee. He will be assisted by a large group of city and state officials and community leaders.

A long list of affiliated organizations meet habitually with the American Public Health Association. They include: the American Association of School Physicians; the Association of Women in Public Health; the Conference of State Laboratory Directors; the Conference of State Sanitary Engineers; the American Association of State Registration Executives; Delta Omega; the International Society of Medical Health Officers.

The attendance at the 67th annual meeting will include public health workers from every State in the Union, Canada, Cuba and Mexico.

The Third International Cancer Congress, under the auspices of the International Union Against Cancer, will be held in the United States, September 11 to 16, 1939, at the Haddon Hall Hotel, Atlantic City, N.J. The President of the Congress is Professor Francis Carter Wood, Director of the Institute of Cancer Research of Columbia University, New York City; Dr. Donald S. Childs of Syracuse, New York, is the Secretary-Treasurer; and Dr. A. L. Loomis Bell, of Long Island College Hospital, Brooklyn, N.Y., is in charge of transportation and exhibits.

The proposed sections are as follows: general research; biophysics; genetics; general pathology of cancer; surgery of cancer; radiological diagnosis of

cancer; radiotherapy of cancer; statistics, and education. Further details concerning section chairmen, committees and other data will be announced later.

The membership fee will be \$15. All inquiries should be addressed to the Institute of Cancer Research, 1145 Amsterdam Avenue, New York, N.Y.

Book Reviews

The Collapse Therapy of Pulmonary Tuberculosis. John Alexander, B.S., M.A., M.D., F.A.C.S. 675 pp., illust., \$15.00. Thomas, Springfield, 1937.

Written by a leading thoracic surgeon who has had much experience and has studied extensively in many of the leading thoracic clinics on this continent and abroad, this book should have a special appeal to those so interested. At the same time, so universal is the need for a constructive attitude in treatment of pulmonary tuberculosis that it could well have a place in the current reading of the physician and the general practitioner. The author has brought to view that hazy therapeutic region between prolonged rest treatment and thoracoplasty, and has shown that it can be utilized with good advantage to the patient in lessening the period of disability and the extent of parenchyma involved, by other surgical measures of proved value.

Pneumothorax, phrenic nerve paralysis, scalenectomy, scalenotomy, oleothorax, closed and open intrapleural pneumonolysis, multiple intercostal nerve paralysis, extrapleural, suprapleural and subcostal pneumonolysis, and the various degrees and types of thoracoplasty are considered fully. One of the several collapse measures should be given consideration even in the minimal stages.

Operative Surgery. M. Kirschner, vol. 3, Ear, Air Passages and Neck. 528 pp., illust., \$13.00. J. B. Lippincott, Montreal, 1937.

The book is divided into two main parts. The first deals with surgery of the ear, nose and throat including the larynx and tracheobronchial tree, and the second part with the surgery of the oesophagus and neck.

In part one the standard operations dealing with disease in the ears, nose and throat are fully described and freely illustrated. One is impressed by the fact that the techniques described are those which have been devised and which are in common use in Europe. Very little reference is made to modern surgical procedures which have been devised and are in common use in America. Many of these shortcomings, however, are pointed out and are in part rectified by the American editors.

In the chapter devoted to disease of the ears, some space has been devoted to plastic surgery. The operations upon the lateral sinus are generously illustrated. In describing the so-called simple mastoid operation, the technique is somewhat more extensive and more radical than that usually carried out in America. A considerable amount of space is devoted to describing radical external operations upon the sinuses. These are well illustrated. The modification of the external sinus operation devised and popularized in America by Lynch, Sewell, Ferris-Smith, and others is not described.

The second part of this book, "Operations on the Oesophagus and on the Neck", includes oesophagoscopy and many external operations, such as the removal of a cervical rib, torticollis, and methods of exposure and operations upon the most important arteries and nerves of the neck. The various types of



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pharyngotomy are described, including the classical but somewhat obsolete method of Kronlein. There is a chapter on operations on the thyroid and thymus, which describes very fully the operation for sub-total thyroidectomy, but the translators differ quite frequently from the author, as exemplified by the frequent passages between parenthesis.

The scope of the book is somewhat unusual and it would appear to be of more value to the general surgeon than to the specialists in the different fields. It would be a definite aid to anyone contemplating surgical procedures in any of the areas described because the instructions and directions are good and the anatomy well described, with illustrations which are clear and liberal in number.

Practice of Orthopædic Surgery. T. P. McMurray, M.B., M.Ch., F.R.C.S. 471 pp., illust., \$6.25. Macmillan, Toronto, 1937.

The subject matter of this book is largely the result of the author's experience, and his object, as stated in the preface, is to give the reader the basic principles of treatment in orthopædic surgery. The author has been successful in doing this, but has paid less attention to etiology, pathology and symptomatology than one might wish. Many orthopædic surgeons on this continent particularly will differ with him as to the rôle of operative fusion of tuberculous joints in children, since here the trend is more and more towards operative fixation in children as well as adults as soon as the general condition of the patient warrants such a procedure. The author recommends operative fixation in children only after prolonged conservative treatment has failed to give firm ankylosis. Many surgeons would also strongly dissent from his advice to correct deformities of tuberculous joints by manipulation under general anaesthesia, even though the author states that he has never seen any evil effects therefrom.

The author rightly believes the diagnosis "Low Back Pain" to be slovenly. However, in dealing with the baffling problem of pain in the low back, he leads one to believe that if the pain is not due to intra-pelvic or intra-abdominal conditions, it is due to a strain of either the lumbo-sacral or sacro-iliac articulations, and further that these two conditions can be readily differentiated, and will respond to certain treatment. That the problem is not so simple as this is evidenced by the voluminous literature on the subject, the countless methods of treatment advocated, and one's own experience. The book is well illustrated.

Injuries and Diseases of the Hip. F. H. Albee, M.D., LL.D., F.A.C.S. and R. L. Preston, M.D. 298 pp., illust., \$5.50. Hoeber, New York, 1937.

Dr. Albee's book on "Injuries and Diseases of the Hip Joint" should prove of definite value to all of those who are interested in hip-joint surgery. The chapter describing the armamentarium necessary and plaster of Paris technique is rarely found so clearly and accurately described. Probably because of his unusual ability to use the electrical saw, he tends to over-emphasize major surgical procedures, when simpler and more conservative procedures might be safer for the average surgeon to use. The chapters dealing with fractures and dislocations are particularly well done. There seems to be a slackening of interest in the final chapters, including that on tuberculous disease of the hip joint. All in all, the book is very well written, the pictures are good, and it is very easy to read.

Eyestrain and Convergence. N. A. Stutterheim, M.D. (Rand.). 90 pp., illust., 7s. 6d. H. K. Lewis, London, 1937.

The object of this book is to show general practitioners and ophthalmologists how to deal satisfactorily with eye-strain. The book is small in size, but not small in importance.

The author lays down the following postulates, among others. The actual primary position of the human eyes is not one of parallelism but of divergence. This primary position is firmly fixed and possesses positional stability and perfect elasticity. The extrinsic eye muscles act as tensors, and not antagonistically. Convergence is regarded as representing an autonomic power of the mind (or brain), which manifests itself as the basic movement of the dual eye and forms the kinetic principle of bifoveal single vision. This convergence acts by visual reflexes only, and not through volition, nor with the assistance of consciousness. Convergence is independent of the action of the muscoli recti interni, superiores and inferiores, and the muscoli obliqui.

The author remarks that eye-strain, so far, has been universally treated by means of spectacle glasses; "errors of refraction" may often complicate eye-strain but they are never the true cause of it. Yet, he admits that well-chosen glasses are very necessary in many cases of errors of refraction. His subject, however, goes beyond the question of the improvement of "visual acuity"; it is the diagnosis and cure of "eye-strain". His views as to this part of the matter may seem, at first sight, to be heretical but are based on sound physiological and anatomical facts, and seem to receive their vindication in the excellent results that he has obtained from his method of treatment.

His line of treatment consists in measures (by the use of prisms) designed to improve the power of convergence. It is not enough, however, for the patient to have a power of convergence sufficient to bring his eyes into a condition of orthophoria at reading distance; he must have sufficient reserve power to be able to overcome the diplopia produced by prisms up to 50° base out in front of the eyes in distant vision.

A table is given of 100 typical cases and details of 19 selected cases which show the efficacy of the author's treatment, which he admits is tedious and exacting.

This book deserves a wide circulation. The views propounded in it will be novel to many, but the author seems to have made out a good case for his conceptions. It should stimulate investigation of this important matter.

Pathology. E. B. Krumbhaar, M.D. *Clio Medica* Series No. 19. 206 pp., illust., \$2.00. Hoeber, New York, 1937.

This book covers in a succinct manner the development of the idea of pathology from the earliest eras, when it was practically non-existent, emphasizing the Galenic influence down the centuries, to the sixteenth, when Vesalius in "De Humani Corporis Fabrica" created a new conception of anatomy and laid the foundation of the superstructure of pathological anatomy and systematic gross pathology developed in the following two centuries by Bonetus, Morgagni, Baillie, etc. This occupies the first four chapters. The next two discuss the initiation of the idea of specific tissue pathology, noting the various anatomists and clinicians concerned, and its culmination in the epoch-making work and publications of Virchow, "the Father of cellular pathology". Chapter VII deals with the integration of the "pathology" concept to include the fusion and correlation of the "structural, functional, chemical, experimental and clinical methods of approach"—in other words continues the discussion of the trend in investigation of disease processes to the present day method in which all available information, clinical and laboratory, is collected and analyzed. The final chapter of the book proper gives an interesting special description of the historical phases of the study of inflammation and cancer.

This is a worthy addition to this admirable series of books which are not expensive and should be in the library of every physician interested in the history of his craft.